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W. E. BALDWIN M.D.

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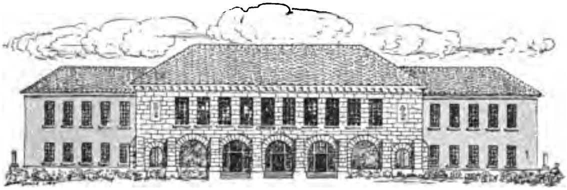

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THE WERNER EDUCATIONAL SERIES

PRIMARY LESSONS
IN
HUMAN PHYSIOLOGY
AND HYGIENE
FOR SCHOOLS

BY WINFRED E. BALDWIN, M. D.
Author of "Essential Lessons in Human Physiology," etc.

WERNER SCHOOL BOOK COMPANY
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Primary Lessons in Physiology.

PREFACE.

This book is intended for the use of children who are just beginning to learn something about the care of their bodies and the laws of health. In order to attract and hold the young pupil's attention, the lessons are presented in a variety of forms, and care has been taken to avoid, as far as possible, the didactic methods so common in text-books on this subject. It is believed that the constant alternation of reading lesson, picture page, oral exercise, story, memory lesson, written exercise, and review will be both pleasing to the learner and acceptable to the teacher. Such facts only are presented as can be readily comprehended by children—such facts only as are of immediate and practical importance to them. In the treatment of these facts, care has been taken to avoid whatever might unduly encourage or cultivate the sense of self-consciousness on the part of the learner—a sense which should not be acquired at too early an age. Hence, very little is said about the structure of "our wonderful bodies," and no anatomical pictures have been admitted.

On the other hand, the pupils are led incidentally to observe some of the most apparent phenomena connected with the life processes—the action and uses of the bones, the muscles, the skin, the heart, the lungs, the brain. They are shown the importance of wholesome food, healthful exercise, pure air, and temperate habits of living. They are induced to learn, partly from direct instruction, partly by observation, why one course of action is conducive to health and happiness while another leads to discomfort, sickness, and perhaps an imperfect manhood or womanhood. The effects of alcohol and tobacco in weakening the bodily powers and diminishing one's chances for success and long life are explained in a simple, and yet forceful, manner. In the preparation of each of the lessons, the author has constantly asked himself these questions: How much of this subject ought young children to know? How much of it can they wisely comprehend? What direct use can they make of this information to the betterment of themselves, both now and later in life? He has occasionally permitted himself to repeat some important statements more than once, but in a different form, to the end that the facts may be the more indelibly stamped upon the learner's memory.

NEW YORK, June, 1896.

CONTENTS.

Lesson.		Page
I.	The Story of the Wheat	7
II.	Something About Bread	14
III.	Other Food Grains	15
IV.	Why We Eat	17
V.	Johnny's Cake	18
VI.	Kinds of Food	20
VII.	Things used for Food	22
VIII.	Where the Food Comes From	24
IX.	What the Food Does	25
X.	Questions	28
XI.	Building Up and Wearing Out	30
XII.	Wholesome and Unwholesome Foods	31
XIII.	The Best Foods	34
XIV.	Water	35
XV.	Water Song	37
XVI.	The Fate of the Barley	39
XVII.	Alcoholic Liquors	43
XVIII.	Foods and Poisons	45
XIX.	Food, or Not Food?	46
XX.	The Teeth	47
XXI.	Things to be Remembered	48
XXII.	Things to Think About	51
XXIII.	Exercise	52
XXIV.	What Exercise Does	58
XXV.	Good Exercise	59
XXVI.	The Bones	61
XXVII.	The Care of the Bones	64
XXVIII.	The Bones Give Shape to the Body	67
XXIX.	The Story of a Weed	68

Lesson.		Page.
XXX.	Tobacco	72
XXXI.	The Blood	73
XXXII.	A Review	76
XXXIII.	Poisons	77
XXXIV.	The Blood-Vessels	79
XXXV.	The Heart	81
XXXVI.	How the Blood Flows	84
XXXVII.	Heart Beats	85
XXXVIII.	The Twin Brothers	87
XXXIX.	Wounded Blood-Vessels	88
XL.	How Tommie Saved Ethel	93
XLI.	The Blood in the Veins	97
XLII.	Breathing	100
XLIII.	How the Blood is Changed	103
XLIV.	The Body's Carrier	106
XLV.	Poisons in the Blood	107
XLVI.	Who Killed Tom Roper?	110
XLVII.	The Need of Pure Air	112
XLVIII.	Air and Food	114
XLIX.	Ventilation	115
L.	The Body's Covering	116
LI.	Three Recipes	120
LII.	The Care of the Skin	121
LIII.	Protectors of the Body	123
LIV.	Three Friends of the Body	124
LV.	False Friends	128
LVI.	A Review	130
LVII.	The Young Persian Prince	131
LVIII.	Five Special Friends	135
LIX.	The Senses	141
LX.	How Our Friends May be Abused	142
LXI.	Things Remembered	144

I. THE STORY OF THE WHEAT.

A READING LESSON.

THERE was once a stalk of wheat that grew in the middle of a field. It was very tall—as tall as a ten-year-old boy—and it lifted its head high and nodded in the wind. All around it were a thousand other stalks, not quite so tall; and every one was looking up at the sun, and bowing to its neighbor, and saying, "Good morning."

"How bright and golden we are!" said the tall stalk; "and how beautiful we look, standing together like a great army of soldiers! The sun shines every day to cheer us; and when the gentle rains come, how sweet and refreshing they are!"

"Yes, yes!" said the other stalks, waving back and forth in the morning breeze. "All the world is very kind to us, and we have naught to do but to live and grow and become bright and golden like the sun."

"Ah, but you are wrong there," said the tall stalk. "It is true that we must live and grow and become yellow and golden; but, after that, there is something else for us to do. In the red house on the hill there is a fair young girl— "

"Yes, we know her!" cried the other stalks, all in a breath. "Her name is Alice, and she often comes into our field to pick daisies and buttercups. But she scarcely notices us and does not seem to care anything for us."

"But listen," said the tall stalk. "The little maiden may not seem to care for us, and yet we are more to her than all the flowers. And the thing that makes me feel most proud and happy is the thought that we live only for her."

"What do you mean?" asked the other stalks.

"Wait and see," was the answer. "But let me tell you that, however proud we may be of our tall, slender forms and noble array, this little girl is worth more than a hundred wheatfields like our own. It is very necessary that she should live and grow and be healthy and beautiful; and it is for us to help her do this. Indeed, this is the only reason why we stand here to-day."

"We don't understand you," said the others.

But the tall stalk only turned its head toward the sun and smiled.

The very next day the farmer came into the fields to look at his wheat. He took some of the bearded heads and rubbed them between his hands. They were full of plump, round, golden grains.

"What fine flour these will make, and what good bread for little Alice," he said. "The wheat is fully ripe and it must be cut at once."

Then all the golden-headed stalks waved back and forth in the wind and whispered to one another: "Now we understand it all. It is for the sake of the fair little maiden that we are here. She must live and grow and be healthy and beautiful; and there is nothing in the world that can help her to do this so well as good bread made from the best of wheat, like that which we bear."

And so, just after noon, the farmer came again; and with him came a number of men and horses, and two or three strange-looking things called reaping machines. These reaping machines were fitted with a number of sharp knives that ran back and forth very fast; and when they were driven among the standing wheat they cut down everything that was in their way. And so the yellow, golden stalks that had lately lifted their heads so proudly toward the sun, were all mowed down and rolled into bundles and bound together in sheaves as large as the body of a boy.

"This is not so pleasant as growing in the sunshine," said the tall stalk, "but it is better than being left alone in the field. It is the only way in which we can at last become properly useful."

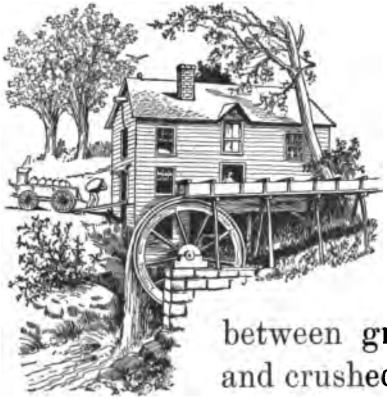
The other stalks that were crowded close around him in the same sheaf, said nothing. But their bearded heads lay lovingly against his own, and he whispered to them:—

"Remember it is all for the sake of little Alice, that she may live and grow and be beautiful."

And now there was plenty of trouble in store for the wheat. It was thrust into a thrashing machine where it was beaten and torn and broken and blown, until it scarcely knew itself any more. The stalks, which were now nothing but common straw, were piled in a stack by themselves; the golden grains were separated from the bearded chaff and poured into sacks ready for the mill.

"Ah, what a terrible time we have had!" said some.

But those which had grown on the tall stalk nestled more closely together, and said, "It is the only way."



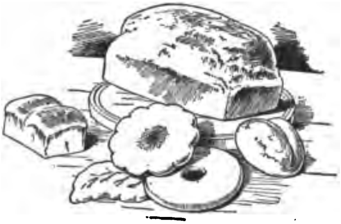
Then the farmer, looking at them as they lay at the top of the sack, said, "What fine flour they will make!"

In a few days the wheat was carried to the mill; and the grains were put between great millstones, and rolled and crushed and ground until they lost themselves entirely. But when at last they had gotten through all their trouble and had come out into the sunlight again, they were white as snow.

"As fine flour as I have ever seen," said the miller proudly.

"We have suffered everything," said the flour, "but we shall be of some use now. See how light and fine we are, and how white and pure! This is better than being a tall plant in the field with nothing to do but nod in the wind."

"It is just the flour that I want," said the master of the red house on the hill. And he paid the miller his price, and carried it home.



"What good bread this will make for our little Alice," said the cook, as she kneaded the flour into dough, and rolled it into biscuits, and then put it into the oven to bake. "It is so pure, so nourishing, so healthful. There is no better food to make one strong and happy."

Then out of the kitchen she came at last,
And what in her hand was she bringing so fast?
'T was a plate full of something all yellow and white,
And she sang as she came with her step so light,
"'T is the best bread and butter I ever did see,
And it is for Alice's breakfast; he! he!"

And Alice when she came down to breakfast was delighted with the fresh, white rolls that her mother gave her to eat. But she did not know that they were made of the wheat which she had often seen growing in the big field where the daisies bloomed.

She did not know that the wheat stalks had once whispered among themselves: "It is for the sake of little Alice that we stand here. For she must live and grow and be healthy and beautiful; and there is nothing in the world that can help her to do this so well as good bread made from the best of wheat."

She only knew that the bread was excellent food, and that she wanted some of it every day.

In some parts of our country there are great fields of wheat where millions and millions of stalks grow tall and ripen in the warm months of summer. Then the grain is harvested, and thrashed, and sent to the mills and ground into flour. And the flour is sent to the farm-houses and the villages and the towns and the great cities in all parts of the world; and then it is made into wholesome bread for the millions of boys and girls and men and women who must have good food every day in order to make their bodies healthy and strong.

II. SOMETHING ABOUT BREAD.

AN ORAL LESSON.

What is wheat? Where does wheat grow?

What is the stalk of wheat? Of what use is it?

Is it fit for food? What is a head of wheat?

Did you ever see a grain of wheat?

What is its shape? its size?

Why is wheat thrashed?

What becomes of the straw?

What becomes of the wheat when it is ground in the mill? Of what use is flour?

How is flour made into bread?

Of what use is bread?

Is anything but bread made of flour?

Why do we eat bread and other food?

Of what use was the wheat to little Alice?

How could it make her grow and be healthy and beautiful? Could Alice live and grow without food of any kind?

Can any one live without food? What is food?

What is the most common kind of food?

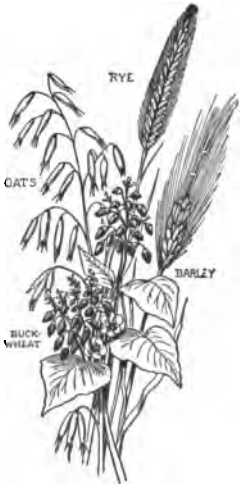
TO THE TEACHER.—If possible the following objects should be shown and talked about while asking the above questions: A complete stalk of wheat; a grain of wheat; straw; chaff; flour; bread; cakes. Talk about the best ways of making bread, and about the most wholesome kinds of bread.

III. OTHER FOOD GRAINS.

A PICTURE LESSON.

Here is a picture of a stalk of Indian corn. A stalk of corn is much taller than a stalk of wheat. The grains grow on an ear, a little more than half way from the top of the stalk. The flower at the top of the stalk is called a tassel. A grain of corn is much larger than a grain of wheat. Ground Indian corn is not called flour, but meal. It is coarser than flour. It is used for making bread and hominy and mush and other kinds of food.

Besides wheat and Indian corn there are some other kinds of grain that are ground into flour or meal and used for food.



The most common of these are rye, barley, buckwheat, and oats. None of them make so good bread as that which is made of wheat.

RICE FIELD.

SOWING RICE.

Rice is a grain that grows in warm countries where the soil is very moist. It is eaten without being ground. In some places almost all the people live on rice, with but very little other food. Besides grains, there are many other things that grow in fields and gardens and are used for food. Name as many of these as you can.

To the Teacher.—Talk about all these pictures. Show specimens of the different grains, if possible.

IV. WHY WE EAT.

A WRITTEN LESSON.

Everybody eats; and yet but few people stop to think why they eat. Write the following sentences and supply the missing words:—

We eat because we are . . . .

We eat because it is . . . . *time.*

We eat because the food is . . . .

We could not . . . . *without eating.*

We would . . . . *if we did not eat.*

Children eat to make them . . . .

The bread which little Alice ate helped to make her . . . . *and* . . . .

The best bread is made of . . . .

Some bread is made of . . . ., *or of* . . . ., *or of* . . . .

Flour is made of . . . .

Everybody eats bread, because it is the . . . . *food.*

Some other foods made from grains are . . . . . . *meal mush,* . . . . *cakes and* . . . .

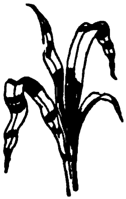
There is no better food for growing children than plenty of . . . . *and* . . . .

Unwholesome food is likely to make people . . . .

V. JOHNNY'S CAKE.

A READING LESSON.

This is the seed, so yellow and round,
That little John Horner hid in the ground.



These are the leaves, so graceful and tall,
That grew from the seed so yellow and small.

This is the stalk that came up between
The leaves so pretty and graceful and green.

These are the tassels, so flowery, that crowned
The stalk so smooth, so strong, so round.

These are the husks with satin inlaid,
That grew 'neath the tassels that drooped and swayed.

This is the silk in shining threads spun—
A treasure it hides from the frost and the sun.

This is the treasure—corn, yellow as gold—
That satin and silk so softly infold.

This is the cake, for Johnny to eat,
Made from the corn so yellow and sweet.

—*The Nursery.*

VI. KINDS OF FOOD.

AN ORAL LESSON.

Besides bread there are many other kinds of food. Try to think of as many kinds as you know.

Write the names of three kinds of food that are good for breakfast. Of three other kinds that are good for dinner.

What other grains, besides wheat, are used for food?

What animals are used for food?

What is the flesh of an ox or cow called when used for food?

What is the flesh of a calf called?

Of a sheep?

Of a hog or pig?

Of a deer?

What kinds of food grow on trees?

Name four kinds of fruit.

What kinds of food grow on shrubs?

What kinds of food grow under ground?

What kinds of food are found in the sea? in rivers and lakes?

What kinds of food must always be cooked before they are eaten?

What kinds may be eaten raw?

What kinds are best raw?

Some foods contain quite a quantity of fat or oil. Among these are the different kinds of meats, beef, mutton, and pork. Butter, which is used in cooking and for eating on bread, has much oil in it. There is some oil in milk.

People who live in cold countries eat more fat than those who live in warm climates.

Many foods contain more or less sugar. All kinds of fruits contain it. Most of the sugar that is used in cooking or upon the table, is made from the juice of the sugar-cane. Maple sugar is made by boiling the sap, or juice, of the maple tree. Another kind of sugar is made from beets. There is also some sugar in milk.

There is a good deal of starch in many kinds of food. Potatoes are made up almost altogether of starch and water. Rice is another starchy food. All grains contain starch; and some of them, such as Indian corn, contain oil.

It is well to remember these three classes of food—those that contain starch, those that contain sugar, and those that contain oil. We could not well do without any one of them.

VII. THINGS USED FOR FOOD.

A WRITTEN LESSON.

Copy and fill each blank space with the right word.

Five grains that are used as food
are ________, ________, ________, ________,
and ________

The flesh of cattle is called
____

Besides beef the following meats
are also sometimes used for food.
________, ________, and ________.

Fruits grow on ________.

The five best fruits are ________,
________, ________, ________, and ________.

Four kinds of food that contain oil, or fats:

______________ ______________

______________ ______________

Four kinds of food that contain sugar:

______________ ______________

______________ ______________

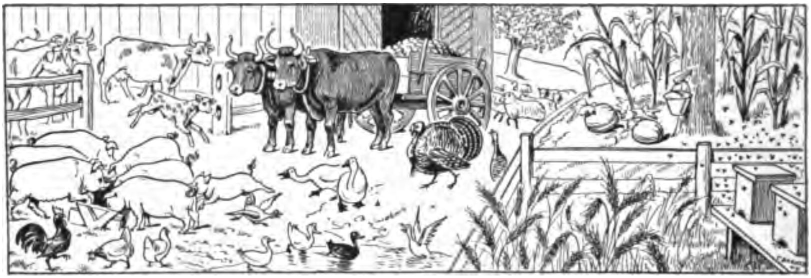
Four kinds of food that contain starch:

______________ ______________

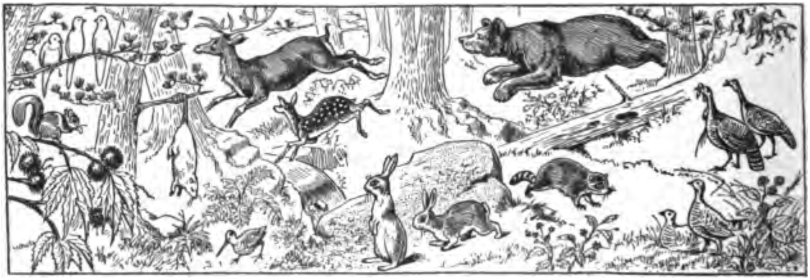
______________ ______________

VIII. WHERE THE FOOD COMES FROM.

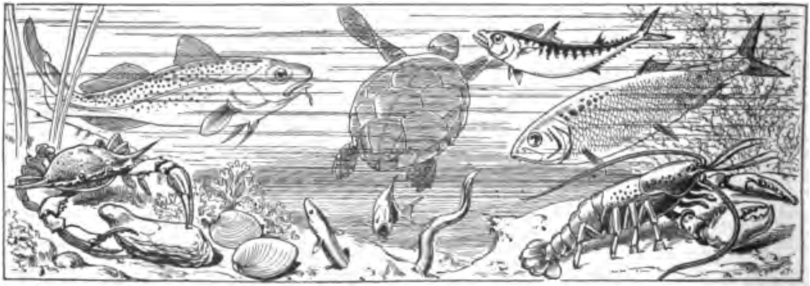
A PICTURE LESSON.



SOME THINGS ON THE FARM.



SOME THINGS IN THE WOODS.



SOME THINGS IN THE SEA.

To THE TEACHER.—Talk about each of these pictures, and in your talk review the facts brought out in the preceding lessons.

IX. WHAT THE FOOD DOES.

A READING LESSON.

If children did not eat they could not live and grow and be healthy and beautiful. You have known this for a long time, and yet perhaps you have never thought to ask why it is so. It is all very wonderful.

By a strange process which I shall not try to explain, the greater part of the food which you take into your mouth and thence into your stomach, is changed into the blood and flesh and bone of your own bodies.

This change is going on all the time, whether you are awake or asleep—but it goes on very slowly, so very slowly that it takes weeks for you to gain a pound in weight or add an inch to your height.

You might grow much faster, however, if it were not for another wonderful process that is taking place every moment of your lives. While the food is being used to build up your bodies and give them strength and symmetry, there are other forces at work which are tearing them down and making them weak.

You ask how this is so? Now, you know that everything wears out with use. The shoes that were bought for you only yesterday have already begun to wear out. Your best suit of clothes will not last long. The most carefully made machines will not run always. Even the best watches wear out after a while and become useless.

Our bodies wear out also—they are wearing out all the time, and if they were not built up by the food which we eat they, too, would soon become useless. This is why men grow weak when they have not food enough; this is why people die when they have no food at all.

By a wonderful arrangement which we cannot exactly understand the particles of food that we have eaten are carried to the very place where they are most needed; and as fast as any part of the body is worn away or torn down, there they are, ready to build it up again.

With children the building up goes on always a little faster than the tearing down, and hence they grow a little heavier and a little taller all the time. But after a while the tearing down or wearing away process becomes so rapid that the food can do nothing more than repair the worn out parts and keep them strong; and this is why most persons, when they have become eighteen or twenty years old, stop growing and increase but little more either in height or weight. Then there comes a time in old age when the body wears away much faster than the food can build it up; and so wrinkles come in the face, the back is bent, the strength of youth is gone.

Did you ever see a new house that was being built up faster than the wind and the weather could tear it down? After a while it will be a finished house, all perfect and complete. As it grows still older, parts of it will suffer neglect and decay. The wind and the weather will tear it down faster than it can be repaired.

It is somewhat the same way with the living body.

When you were sick and could not take sufficient nourishment your body wore away very fast; your face became pale, your hands were thin and small, and your legs were so weak that they could not bear your weight. But when you began to feel better and could eat good food, your strength began to come back to you; little by little the red flush of health came into your cheeks, you felt your fingers growing strong again, and soon you could walk and run as well as ever.

The wholesome food which you had taken into your stomach was being changed into blood and flesh and bone, and used to build up and renew those parts that had been worn away during your illness.

X. QUESTIONS.

AN ORAL LESSON.

Could children live and grow if they did not eat?

What then is one of the uses of food?

Why do grown-up people need food?

Into what is food changed after it has been taken into the stomach?

A WELL-FED CHILD.

Why do people become thin and pale when they have not food enough?

Why do we ever get hungry?

What does hunger tell us?

A HUNGRY CHILD.

Why have people sometimes died of hunger?

When the particles of food that we have eaten are needed to repair some part of the body, what becomes of them?

Answer: They are carried by the blood to the parts of the body where they are needed. Some are changed into bone, some into flesh, and some into other substances. In other words, they are used for building up the body.

In what persons does the building up of the body go on faster than the tearing down?

If the body is worn away just as fast as it is built up, is there any real growth?

In what persons does the body wear away a little faster than it is built up?

Why do all persons need food?

When people are sick and cannot take food, why do they become so weak?

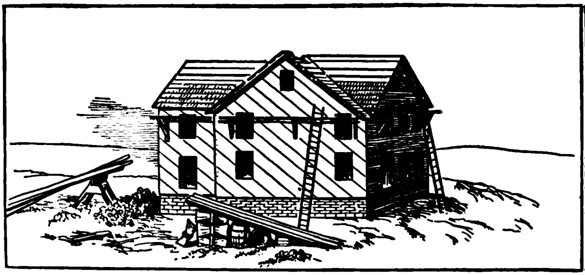
Some foods are wholesome and others unwholesome. It is only the wholesome foods that build up the body in the proper way; it is only the wholesome foods that give strength; it is only the wholesome foods that give health. Can you name five wholesome foods?

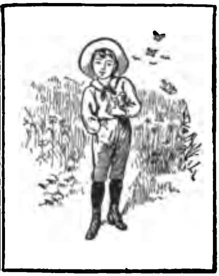
Unwholesome foods may preserve life for a while, and hence they are sometimes eaten by persons who cannot obtain wholesome foods. Some unwholesome foods taste good, and are often eaten for that reason alone. Can you name some such foods?

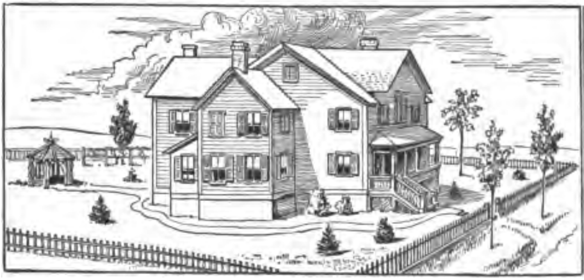
To the Teacher: Try to illustrate, by the use of various objects, the processes of wearing out and repairing, of building up and tearing down.

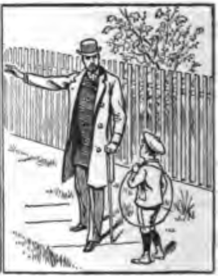
XI. BUILDING UP AND WEARING OUT.

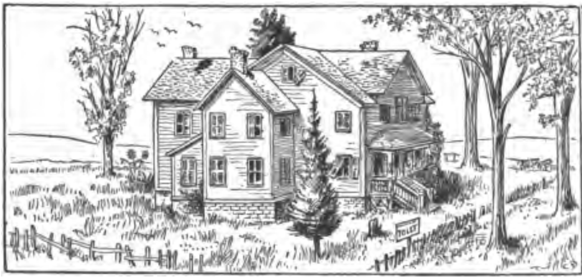
A PICTURE LESSON.

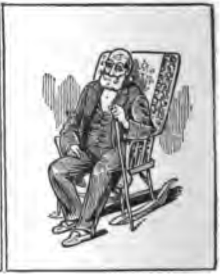












To the Teacher: Lead the children to see the points of resemblance between the life of a human being and the building and decay of the house.

XII. WHOLESOME AND UNWHOLESOME FOODS.

A LESSON TO BE STUDIED.

Some foods are wholesome, others are unwholesome.

Wholesome foods build up the body and make it grow strong.

Unwholesome foods are likely to cause sickness, and they do not properly strengthen the body.

Children, and grown people also, often eat unwholesome food because it tastes good. Sometimes they eat it because they can get no other.

The most wholesome foods are those that are the most nourishing — those that are the most readily changed into blood and flesh and bone, and hence are best fitted to repair the worn away parts of the body.

Good bread, whether made of wheat flour or of corn meal, is very wholesome. Fresh butter is also wholesome and may be eaten with the bread as a relish. Scarcely any food is better for growing children than plenty of bread and butter.

Milk—pure, sweet milk—is one of the most nourishing of foods. One could live on milk alone for a long time.

Eggs are also very nourishing; but they are the most wholesome when they are not cooked too hard.

Of all the kinds of meat that are eaten, beef is the best for giving health and strength to the body.

All meats are good for food, but they are better roasted than boiled, and better boiled than fried. Some of them should be eaten sparingly. Children are often made sick by eating too much pork or too much veal; and then their growth is hindered, and they do not become so robust and strong as they might. Even too much beef is harmful, and, although it may taste very good, one should always be careful to eat only enough.

It is dangerous to eat pork chops, ham, bacon, or, indeed, any meat of the pork kind, unless it has been thoroughly cooked. Many lives have been lost by eating raw or half-cooked pork.

Children, and grown people also, often eat too many sweetmeats. It is very easy to do this; for a small quantity of any kind of rich food is enough. When too much is eaten it causes sickness, as most people have learned to their cost; and even when one does not become really sick, the growth of the body is hindered and the health injured. A great many children are made weak and puny all their lives by indulging in foods of this kind.

Almost all fruits, when ripe and fresh, are healthful and life-giving. Of food of this kind one can hardly eat too much—but remember, it must be *ripe* and *fresh.* Green fruits and fruits that have begun to decay are likely to make those who eat them very sick indeed.

Apples are especially wholesome. Small fruits, such as strawberries, raspberries, cherries, and currants, are all excellent in their proper season, and may be eaten either raw or cooked. Bananas, oranges, and other tropical fruits, are always beneficial. In some of the warm countries people eat but little food except fruits, especially the banana.

Vegetable foods, such as beans, peas, turnips, cabbage, and potatoes, are full of nourishment for the body. In hot weather it is better to eat plenty of these and not so much meat; for fatty foods and foods that contain much sugar are apt to increase the heat of the body. But vegetables that have begun to decay are not wholesome.

XIII. THE BEST FOODS.

The best foods are ______________.

The best meats are ______________.

The best ways of cooking meat are

______________________.

The best fruits are ______________.

The best vegetables are ____________

The best foods for hot weather are

______________________.

The best sweetmeats are the purest.

Fruits are unwholesome when they
are ______ or have begun to ______.

Vegetables are unwholesome when
they have begun to ____________.

XIV. WATER.

AN ORAL LESSON.

Which one of the foods is often taken as a drink?

What animal supplies us with milk?

What articles of food are made from milk?

What other drink is much more common than milk?

Do all living things drink water?

How is water obtained?

When one is in want of food, we say he is hungry. What do we say when he wants water?

What does thirst tell the person who feels it?

When is water pure?

Is impure water wholesome? Why not?

The best of all drinks is water.

We could not live without water.

If it were not in some way mixed with the food which we eat, the blood in our bodies could not flow, and we would soon die of thirst.

Some kinds of food are in large part made up of water. Milk is composed of water and many other

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To the Teacher: Illustrate this lesson with objects — pure water, impure water, fresh milk, sour milk, etc.

wholesome, nutritious substances. Water and flour are mixed together to make the dough that is baked into bread and cakes. All kinds of meats and all kinds of fruits contain water. Some kinds of vegetables, such as turnips and potatoes, have a great deal of water in them.

In order that our bodies may be healthy and strong, it is very necessary that we should drink more or less pure water every day. We need more of it in warm weather than in cold, and more when we are at work than when we are quietly resting.

Many people drink coffee and tea instead of pure water.

Coffee is made from the seeds of a coffee plant, roasted and ground and then boiled in water.

Tea is made by boiling the leaves of the tea-plant, or by steeping them in water.

It is not best for any one to drink too much tea or coffee. Children who drink only pure water, or good, sweet milk, are likely to be much healthier and happier than those who indulge in the use of other drinks.

To the Teacher: Subjects for object lessons: Pure water and impure water; coffee in its various stages of preparation; tea in different forms.

XV. WATER SONG.

A LESSON TO BE MEMORIZED.

"Water! water!" cries the bird,
With his gentle, tuneful note;
And the liquid sound is heard
Purling from his little throat:
"Water! water, clear and sweet—
Te-weet! te-weet!"

"Water! water!" says the tree,
With its branches spreading high;
"Water! water!" rustles he,
For his leaves are never dry.
Water! water for the tree,
Water, pure and free!

"Water! water!" sings the flower,
Whispering with its perfumed breath;
"Let me have it every hour,

Or I thirst, and droop in death.
Water! water, soft and still,
Water is my will."

"Water! water!" sighs the grain,
With its yellow head on high;
And the meadow, field, and plain
Join together in the cry—
"Better far than yellow gold,
Water giveth wealth untold!"

Water, water, clear and pure,
Is found in nature everywhere.
If you drink it, I am sure
It will never prove a snare.
Water is the thing for me—
Yes, for you and me.

Water! water! Young and old
Drink it pure, and clear, and sweet.
Do not heed the tempter bold
Who meets you on the street;
For water is the drink for me—
Youth, for you and me!

XVI. THE FATE OF THE BARLEY.

A READING LESSON.

There was once a field of barley on the side of a hill where the sun shone warm every day. The stalks of barley grew very close together, and they were so tall and bore such fine heads that many people mistook the field for a field of wheat. But the barley ripened earlier than the wheat, and the farmer and his men came with the reaping-machines and cut the stalks down and bound them into sheaves.

"It was all very pleasant," said one of the heads, "growing on the hillside, with nothing to do but to look up at the sun. And yet it was very tiresome, staying all the time in one place. I hope that now we shall see some of the world."

"And I hope that we shall find something useful to do," said his neighbor, who was bound up with him in the same sheaf. "Perhaps we shall be ground into flour, and made into bread, and go to help some little child grow healthy and strong, just as I have heard the wheat in the next field is to do."

"Don't think of such a thing," said a daisy that grew close by. "For I have heard people say that barley bread, although wholesome, is never so good as wheat bread; and there is so much wheat this year that nobody will want to eat cakes made of such as you."

"Well, then," said the barley, "why did the farmer take so much pains to raise us? And of what use shall we be to the world after all?"

"Perhaps the farmer will feed you to his horses," said the daisy.

"That is not at all likely," said the barley. "The oats and the Indian corn in the next field are for the horses and the cattle."

Just then the farmer's men came with the wagons, and the sheaves of barley were gathered up and hauled away to the thrashing-machine. The stalks were stripped and beaten and torn. The grains were knocked out of the heads, and separated from the chaff; and finally all fell by themselves into a measure, and were poured into large, strong sacks.

"This is just the way they do with the wheat," said the barley. "Surely a happy future is before us. We shall now be carried to the mill and ground into flour."

But a very different fate awaited the barley. Instead of being taken to the mill it was hauled to a great tall building, where there was much dirt and an unpleasant smell and many strong casks and barrels.

"It is as fine barley as you ever saw," said the farmer, opening one of the sacks. "It is almost as good as wheat."

"It is better than wheat for my purpose," said a fat man with a red nose, and puffed-out, bloated cheeks. "And yet all kinds of grain make good liquor. This barley we will brew and make into beer. If you have corn to sell, bring it to us and we will distill whisky from it. We will pay you cash prices for all that you have to spare."

And now the barley was made to pass through many trying processes. It was thrown into a stone cistern and kept covered with water until the grains were swollen to almost double their first size. Then it was shoveled out and allowed to lie in a warm room until a little sprout and several rootlets began to grow out from each grain. Then it was thrown into another room, or kiln, where it was so warm that all the life was dried out of it. After that it was ground, and mixed with water and yeast, or with water in which hops had been boiled. The whole mixture was then mashed, and boiled, and cooled, and allowed to ferment. By this time all the solid parts of the grain had been removed, and nothing but a foaming liquor called beer, or ale, was left. This liquor was then drawn off into casks or kegs, and was sent into the town to be sold. And such was the end of the barley that once grew in the sunshine on the side of the hill.

HOPS.

Did it help any child to live and grow and be happy and beautiful? Did it feed any one that was hungry? Did it help to make the weak strong?

If it did not do any of these things, it was through no fault of itself, but because the men who owned it put it to a wrong use, and made of it a poisonous liquor instead of wholesome bread.

XVII. ALCOHOLIC LIQUORS.

A LESSON TO BE STUDIED.

Beer is commonly made from barley; but it may be made from other grains. It contains a poisonous substance called alcohol.

Whisky is made from corn, rye, wheat, and other grains. It contains a great deal of alcohol.

Wine is made from the juice of grapes and other fruits. It also contains alcohol.

Cider is the juice of apples. When it is fermented it is called "hard cider," and then it contains more or less alcohol.

CIDER MILL.

Brandy is made by distilling different kinds of wine or fruit-juices. Like whisky, it contains a great deal of alcohol.

Pure alcohol is very poisonous, and if taken into the stomach will produce death.

It is the alcohol in beer, whisky, wine, brandy, and other liquors that causes men who drink them to become drunk.

All liquors that are mixed with alcohol are called *alcoholic liquors.* No one can drink any of these liquors without taking into his body the poison which they contain.

This poison, if taken even a little at a time, is apt to do harm. The person who takes it often in this way is in danger of being injured by it both in body and in mind.

Alcohol, like other poisons, never builds up, but always weakens and destroys. It often causes those who use it to be untruthful, to be cruel and selfish, and to do many wicked deeds.

Perhaps the strangest thing about it is that it makes those who once begin its use want more and more of it all the time. People who at first drink only the milder liquors—wine, cider, or home-made beer—are very often led into the taking of brandy and whisky, and, after a while, become drunkards.

The only safe rule about the use of all kinds of alcoholic liquors is this:—"Touch not, taste not, handle not."

If every person would follow this rule, the world would be a great deal happier than it is.

XVIII. FOODS AND POISONS.

A REVIEW LESSON.

Write the following sentences:

1. Food is that which builds up our bodies and makes them strong and healthy.

2. There are two kinds of food: solid food and liquid food.

3. The best solid foods are ....

4. The best liquid foods are clear water and pure milk.

5. Poisons are not foods. When taken into the stomach they injure the body; they cause sickness and often death; they hinder the body from becoming healthy and strong.

6. Alcohol is a poison.

7. All alcoholic drinks are poisonous.

8. To be healthy and happy, one should eat plenty of wholesome food, but never too much.

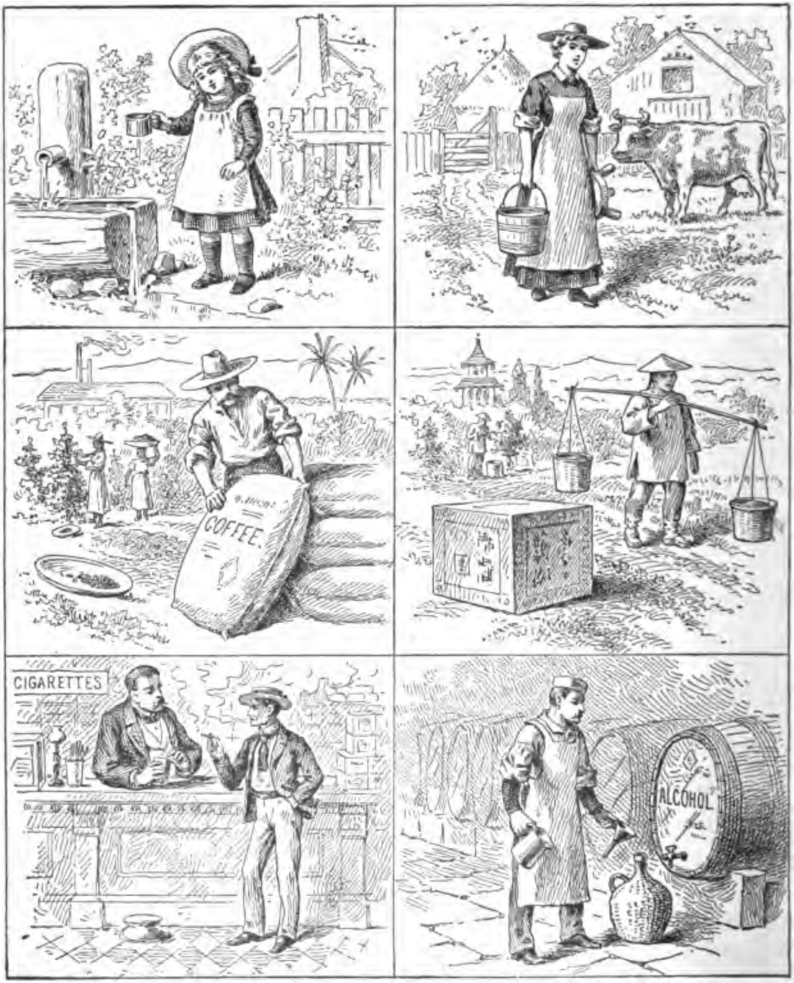
9. To be strong and free from disease, one ought to shun every kind of poison.

10. No person can drink alcoholic liquors without being injured by the poison that is in them.

11. The only safe rule about such liquors is this: "Touch not, taste not, handle not."

XIX. FOOD, OR NOT FOOD?

A PICTURE LESSON.



XX. THE TEETH.

AN ORAL LESSON.

How many teeth have you? Count them.

How many on each jaw?

Have you ever lost any teeth? If so, have other teeth grown in their places?

The first set of teeth which children have are called *milk-teeth*. When these come out or are lost, they are replaced by another set called *permanent teeth*.

If a permanent tooth decays, or is pulled out, no other tooth will ever grow in its place.

Feel of your front teeth. Now feel of the teeth farther back in your mouth. What difference do you notice between the front teeth and the jaw teeth?

A FRONT TOOTH.

A JAW TOOTH.

For what do you use the front teeth most? For what do you use the jaw teeth most?

Dogs, cats, and all animals that eat much flesh food have very sharp teeth. What kind of food do cows and horses eat? What kind of teeth have they?

What kind of teeth are best for grinding grain and other solid food? What kind are best for tearing flesh? Why is it necessary to chew the food?

XXI. THINGS TO BE REMEMBERED.

A LESSON TO BE STUDIED.

If the food is not chewed it will often be hard to swallow. It will sometimes stick in the throat, and is likely to cause choking.

If the food is swallowed without being chewed it can not be readily acted upon in the stomach. It can not be properly changed into life-giving blood and into flesh and bone; and therefore it can not build up the worn-out parts of the body as quickly and as perfectly as it ought. It lies unchanged in the stomach for a long time, and causes pain and sickness.

Here, then, is a good rule for every one who wishes to keep well:—

Do not eat too fast. Chew the food thoroughly before swallowing it.

If one's teeth are broken or decayed it will be much harder to chew the food well, and some of it may be swallowed too soon. Carelessness and haste in chewing food sometimes helps to bring on a troublesome disease called dyspepsia.

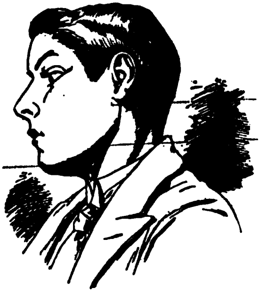
Broken or decayed teeth in the mouth do not make their owner handsome. They sometimes cause the breath to be offensive. They often ache and cause much distress and pain.

And so, you should bear in mind another good rule: *Always take good care of the teeth.*

How shall this be done?

It is very easy. Never try to crack nuts or bite very hard substances with your teeth. Keep them clean by washing them carefully with tepid water and a soft brush every morning and evening.

In chewing the food and making it ready to be swallowed, the teeth are helped by the other parts of the mouth. The lips keep the food between the jaws. The tongue moves it from place to place as needed. The tongue, by tasting it, tells you whether it is the kind of food that you like; and at last, when it has been well chewed, it draws it back toward the throat and helps you to swallow it.



SALIVARY GLANDS.
(The dotted lines point to the places where the glands are.)

In the cheeks, above and below the mouth, there are several small glands that do their part toward making the food ready to be swallowed; for they send into the mouth a kind of liquid called saliva, which moistens the food and softens it. Indeed, they are constantly sending a little of this saliva into the mouth, and this keeps the tongue and lips moist.

Sometimes when one is sick and feverish these glands cannot do their work; and then the mouth and lips become dry and parched, and one must needs have water to moisten them and the throat.

The saliva, by moistening the food, makes it softer and more easily swallowed. Many people are in the habit of drinking water or some other liquid when eating. This is often unnecessary; and sometimes it is harmful, because it causes the food to be swallowed before it has been properly chewed.

The saliva is better than water for moistening the food. It helps to put the food in a right condition to be changed in the stomach.

Alcohol injures the glands that supply the saliva. The use of tobacco is often very harmful to these glands. Hence people who use alcoholic drinks, or tobacco in any form, are likely to suffer from dryness of the tongue and throat, unless they are constantly drinking or chewing or smoking. This is one reason why those who once begin to indulge in these habits find it so very hard to leave them off. This also is why so many drinkers and chewers finally suffer from diseases of the throat and stomach.

XXII. THINGS TO THINK ABOUT.

AN ORAL LESSON.

If a person would be healthy, handsome, and strong, what kinds of food ought he to eat?

What kinds of food ought he to let alone?

What should he do with all poisons that come in his way?

What ought he to do about eating candies and sweetmeats?

How much food should he eat at a time?

What will he drink?

What kind of drinks will he avoid?

What rule will he observe about chewing his food?

What rules will he observe about the care of his teeth?

◆

Is it better to be healthy and strong than to be weak and sickly? Why?

What ought every person to do in order to be healthy and strong?

Can young people do anything to make themselves healthier and happier when they grow older?

Name two or three things that every one can do.

We will learn about other things as we go on.

XXIII. EXERCISE.

A LESSON TO BE TALKED ABOUT.

Some men are much stronger than others.

Some boys and girls are much stronger than others of the same age. They have always been so. We say they are stronger by nature.

"SOME BOYS ARE STRONGER THAN OTHERS."

But even the weakest young person may do something to improve his strength. Some of the strongest men were once very feeble little boys. They gained much of their strength by observing the rules that we have already noticed about the use of foods and drinks.

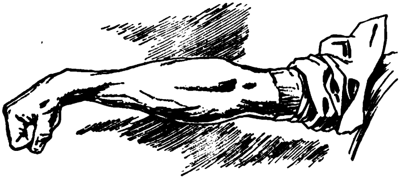
You ask why any one should need to be strong?

Every one wants to be happy. But to be happy one must needs have a healthy body. A perfectly healthy body always has its due amount of strength. Hence happiness and health and strength almost always go together. In any case, the strong man or the strong woman is less likely to be sick than one whose body is feeble and unable to resist disease. And who would not like to keep well all the time?

The greater part of the strength of our bodies lies in our muscles.

What are the muscles?

They are the fleshy portions of the body.



"BARE YOUR ARM AND CLENCH YOUR FIST."

Bare your arm and clench your fist. Can you not see the swelling of the muscles in the part below the elbow?

Now move your fist back and forth. Strike out hard in front of you. Can you not see the swelling of the muscles in the part above the elbow?

Did you ever notice the muscles in the arm of a baseball player? Have you ever seen how large and strong the arms of a blacksmith are? The arms of these men were once as weak as yours. In what way did they gain so much strength?

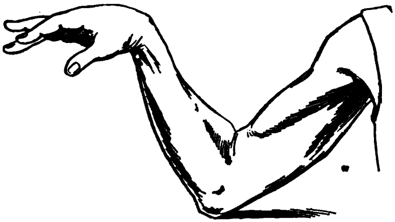
ARM OF A BASEBALL PLAYER.

A very important thing to be remembered is this:

Exercise gives strength.

To make any part of the body strong it should be used. It should be used in the right manner. It should be used often, but not so often or in such a way as to overtax its strength. This is what is meant by *exercise.*

And then one must have patience. The pitcher at baseball did not get his skill or his strength of arm in a single day—no, nor in a single year. It was only after patient exercise, every day for many, many days, that the muscles of his arm and shoulder began to show an increase in size and in the ability to do just what their owner wanted them to do.



“RAISE YOUR HAND.”

ARM OF A BLACKSMITH.

All the strength of the body is in the muscles. We could not move any part of the body without the help of the muscles.

Raise your hand. The muscles in your arm help you to do this. Raise it again, and see how the muscles move at the same time.

Now hold your fingers straight, and move them up and down. The muscles which do this are in the forearm, below the elbow. See the cords on the back of your hand, one for each finger. If your hand is so plump and fat that you cannot see them, try whether you cannot feel them with the fingers of the other hand. Some arms are so round and plump that you cannot see the movement of any of the muscles in them.

"SEE THE CORDS ON THE BACK OF YOUR HAND."

Now move your fingers up and down again as before. See how these cords move. They are called tendons, and if you could see one of them as it really is, you would find that it is white and glossy and very strong. One end of the tendon is in the muscle in the fleshy part of your forearm. The other is fastened very tight to the bones of the fingers.

"SOME ARMS ARE SO ROUND AND PLUMP."

Now bend the fingers at the

joints as if you were going to grasp something. The muscles which help you to do this are quite small. Some of them are in the arm, and some of them are in the palm of the hand. They also are attached to the bones of the fingers by means of little white cords called tendons.

"SOME OF THE MUSCLES ARE IN THE PALM OF THE HAND."

And so it is all over the body. Everywhere there are muscles ready to put in motion any part that you may wish to move. But these muscles, in order to do their work well, must be trained by practice to move exactly as they should.

When you first tried to catch a ball, you could not do so, because the muscles which should help you had not been trained. One reason why you can write better with the fingers of the right hand than with those of the left is because they have been trained by practice. No one can learn to play a piano without long and patient practice, in order that all the muscles of the fingers, the hands, and the arms shall move just exactly as they ought. No one can do fine work of any kind without first training the muscles.

Here then is another important fact to be remembered:

Exercise gives skill.

And now it will not be hard for you to understand that in order to give strength to your bodies you must exercise; and in order to be skillful in any kind of work or play, you must exercise. The boy or girl who is too indolent or careless to observe these rules will not grow up to a strong and healthy and happy manhood or womanhood.

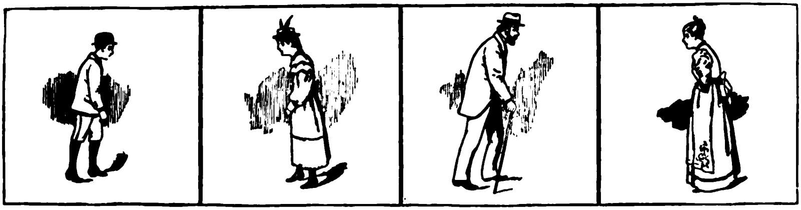
Children like to play; and every kind of play that puts the muscles of the body into motion is good exercise. It is best, whenever possible, to take exercise in the open air; for there is nothing like pure air to make one healthy, happy, and strong. But you will learn more about that after a while.

Some kinds of work give exercise to all parts of the body; other kinds give exercise, as you have seen, to only one part.

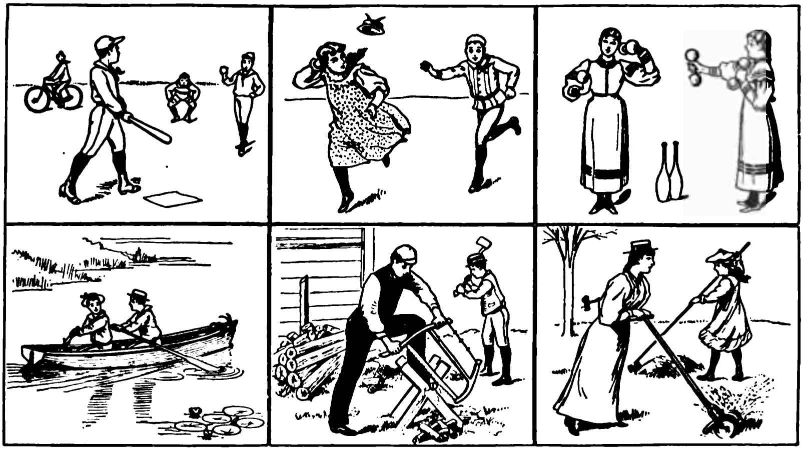
In order that any kind of exercise shall do the most good, you must enjoy it. Work may be as good as play if you enjoy it as well. But exercise which causes you to feel very tired is not likely to do you much good. You should never play so hard as to overtax your strength.

XXIV. WHAT EXERCISE DOES.

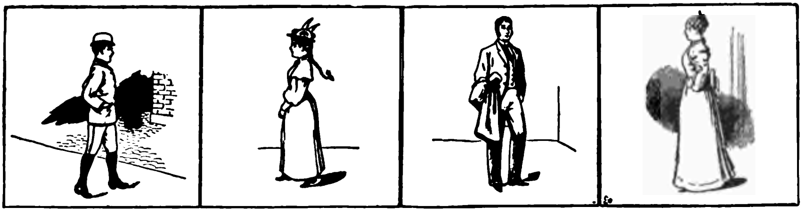
A PICTURE LESSON.



THESE PERSONS DO NOT TAKE PROPER EXERCISE.



THESE ARE SOME OF THE WAYS IN WHICH THEY MIGHT TAKE EXERCISE.



THESE PERSONS TAKE PROPER EXERCISE.

XXV. GOOD EXERCISE.

Walking is good exercise for almost everybody.

Running is good exercise for children.

Playing ball is good exercise if one does not play too hard.

Lawn tennis is fine exercise

Riding a good bicycle on good roads is excellent exercise for young and old.

Any kind of indoor exercise is good if it sets the muscles properly to work.

There are many other kinds of exercise that are good for young people.

Running errands for mother,
Helping with the work in the house,
or on the farm;
Digging in the garden,
Sawing and splitting wood ——
These last are more like work than
play, and yet they are good exercise
and will help the muscles to grow
strong.
Take some kind of exercise every day
Take it in the open air if you can.
Try to bring all the muscles of the
body into action.

Write something about some other kinds of exercise.

XXVI. THE BONES.

AN ORAL LESSON.

Count the bones in your little finger.

See whether each of the other fingers has as many.

How many bones are in your thumb?

How many bones can you feel in your arm?

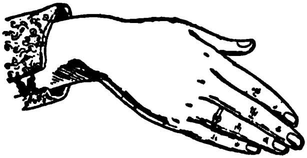
How are the bones of the fingers moved?

If there were no bones in the fingers and hands could you make much use of them?

Why not?

Of how much use would your arms be if there were no bones in them?

The bones, then, are of great use to us, because they help the muscles in moving the different parts of the body. Now, can you think of any other way in which they are useful?


"LONG AND SLENDER."

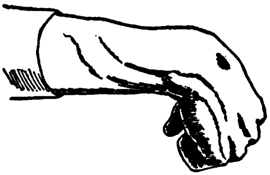
Some people's fingers are slender, long, and graceful; others' are short and stubby; others' are crooked and ill-shaped. What gives these different shapes to different fingers?

"SHORT AND STUBBY."

Now feel of the top and back of your head. Do you notice that underneath the skin there is everywhere a bone that gives shape to your head? The name that is commonly given to this bone is the *skull.*

The skull has another use besides giving shape to the head. It is hollow, like an egg, and inside of it is a very important part of yourself, which is called the brain. You could not live if the brain should be badly hurt. The skull encloses it like a strong box and protects it from injury.

You have now learned that the bones have three uses. What are they?



"THE JOINT BETWEEN THE HAND AND THE ARM."

"CROOKED AND ILL-SHAPED."

Now look at your fingers again. What do we call the place where two bones come together? How many joints are there in your little finger? How many in your thumb?

What is the joint called that is between the hand and the arm?

What is the joint at the middle of the arm called?

" THE JOINT AT THE MIDDLE OF THE ARM."

The bones are fastened together at the joints. If this were not so they would be all the time falling apart, or, as we say, "getting out of joint." They are fastened together by very strong cords called *ligaments*. But these ligaments are so attached that they do not hinder the free and proper motion of the bones.

Sometimes an arm or a leg may be so wrenched and twisted as to put some of the bones out of joint.

In such case, a doctor should be called in to put the bones in place again. And then great care should be taken not to use the limb until after the torn ligaments have healed and grown strong once more.

Now feel of your head again.

Do you notice any joints in your skull?

Can you feel more than one bone in your head?

The skull is really composed of several bones; but these are joined together so perfectly that you would never know it. There are no ligaments in the joints of the skull. The bones are united by means of notched edges which fit exactly, one into another. They do not move at the joints as other bones do.

XXVII. THE CARE OF THE BONES.

A LESSON TO BE STUDIED.

You have seen the bones of animals, how hard and strong they are. The bones of our bodies are also strong, and it would take a great deal of force to break one of them. Yet they may be injured in many ways, and for that reason we should be careful how we use them.

The bones of children are softer than those of grown-up people. They bend much more easily, and so they are not so likely to be broken. The bones of aged persons are quite brittle — so brittle that they are sometimes broken by a slight jar or fall.

The bones like the muscles grow stronger with exercise. If misused they may be bent out of shape. Some boys and girls have a habit of bending over their books while studying. Others have a careless way of standing, so that the shoulders are thrown forward and drawn toward each other. This is the reason that so many young people grow up to be round-shouldered and narrow-chested.

In walking or riding, you should always try to keep the body erect, with the head and shoulders thrown a little backward rather than forward.

Tight clothing about the waist is likely to press the ribs out of shape and in other ways injure one's health. Tight shoes cause the bones of the toes to become deformed.

If young people would grow strong and handsome, and if they would have erect and graceful bodies, and withal be healthy and happy, they must take care not to injure the muscles or bones in any way; but they must try by proper exercise and patient training to promote their strength and usefulness.

Did you ever notice the difference between the person who carries himself erect and the one who walks with his shoulders carelessly thrown forward? Look again at the pictures on page 58. Which person would you rather have for your friend? Which do you think is the happiest? Which do you think would be most likely to succeed in life? Which will you imitate?

A girl may have a homely face, and yet if she has a graceful form she will be beautiful. On the other hand, the prettiest face loses its attractiveness when it belongs to a person who, through carelessness, has acquired habits of stooping or of allowing the shoulders to droop forward.

Sometimes a young person who is growing rapidly lacks sufficient strength to keep the body always in a proper position. But even in such a case, proper exercise and constant care will overcome the tendency to become stoop-shouldered. The habits which you acquire when young will have much to do with your appearance when you are older.

The bones as well as the muscles are made from the food which is eaten. They are being worn away all the time, but are all the time built up again and repaired. It is easy to understand, therefore, that in order that one's bones may be healthy and strong he should eat the wholesomest food, and drink pure, health-giving water.

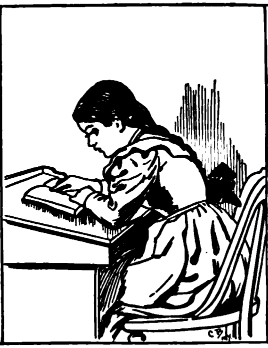
Alcoholic liquors injure the bones. If a person who uses such liquors has an arm or a leg broken, it will not heal for a long time. Even when it is thought to be healed it remains weak and is sometimes distorted or deformed.

There is another substance that does great harm to the bones, and especially those of growing boys. That substance is tobacco. Boys who acquire the habit of smoking cigars seldom grow to as fine and noble manhood as would otherwise be the case. Tobacco stunts the bones and hinders their growth. It is one of the worst foes of growing boys.

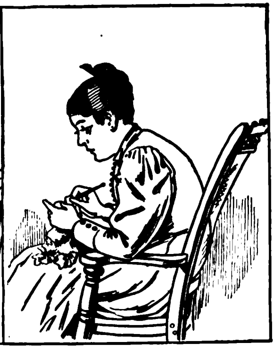
XXVIII. THE BONES GIVE SHAPE TO THE BODY.

A PICTURE LESSON.

A GRACEFUL FORM.

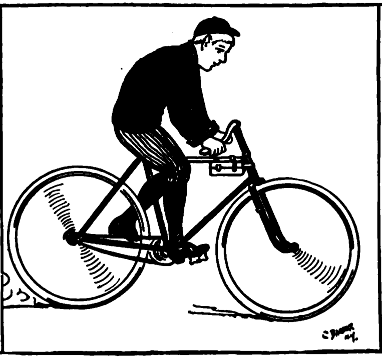


This girl is in the habit of leaning over her desk.

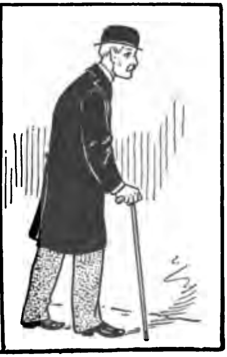


When she becomes a woman, her shoulders will be round and ill-shaped.

A HEALTHY BODY.



This boy is in the habit of bending his back when riding his bicycle.



When he becomes a man his back will be permanently bent.

XXIX. THE STORY OF A WEED.

A READING LESSON.

There was once a farmer who had a large field full of weeds. Strange to say, he had planted the seeds from which these weeds sprang. When they grew up, large and tall, with broad spreading leaves, he was very proud of them.

"A FIELD OF WEEDS."

He plowed among them, and stirred the ground about their roots, and would not allow any other plant to grow near them. He took much better care of these weeds than he did of the corn which grew in the next field. Every morning he went out and turned over the leaves to see that no worms had come in the night to eat them.

At last when they had grown to their full size he made ready to harvest them and gather them into the sheds which had been built to shelter them.

One of these weeds grew quite near the fence, and over the fence there leaned a tall stalk of Indian corn.

"I cannot understand why our master should take so much trouble with you," said the corn, when he saw that the weed was soon to be removed from its place. "Pray tell me, of what use are you in the world? Can you feed the hungry?"

"Nothing will eat me," answered the weed, "except the ugly worms which our master destroys. Hungry men sometimes chew me and think that they are being fed—but I am only deceiving them."

"Perhaps you are a clothier, like my friend Flax over the way," said the corn.

"Oh, no," was the answer. "I never clothe anybody. On the other hand, I have known many a child to go thinly clad all through the winter in order that his father might have money to buy me."

"Well, then, since you are fit for neither food nor clothing, kindly tell me what you are good for," said the corn impatiently.

The weed held his head very high and proudly said: "I am good for nothing. Yet, what of that? Every year more money is spent for weeds like me than for all the bread in the world. Men love me."

"Why do men love you?" asked the corn.

"They say that I make them strong and happy."

"And do you really make them so?"

"I make them imagine that they are so. But in reality I take away their strength, and sometimes their pleasure too. It is all the same to me—I am only a weed. And yet I am the most powerful monarch in the world. More than half the men that live are my slaves."

"Why do they allow themselves to be enslaved by such as you?" asked the corn, standing up as straight as he could.

"They say that it is the mark of a gentleman to be my slave," answered the weed; "and as everybody, whether man or boy, wants to be thought a gentleman, it is only necessary for any one to believe this, and he is mine forever afterward. It is very hard for any of my slaves to escape, and indeed very few of them care to try."

"It is all very strange," said the corn with a sigh.

"Yes, it is strange," said the weed. "But you must remember that I am a deceiver. I make men believe that it is gentlemanly to fill the air with smoke, and the floors and sidewalks with filth. I make boys imagine that it is manly to strut the streets with cigarettes between their teeth. I even persuade some good people that it is healthful to burn their nostrils and throats with snuff, thus deadening their sense of smell and taste and helping to lay the foundations of disease. If they only knew the truth: That I am their enemy; that I never give them strength; that I often prevent their food from being properly changed into blood and muscle and bone; that I hinder the growth of boys so that they never attain the height and strength which they ought; that I cause their muscles to remain small and weak; that I discolor their teeth and cause them to decay; that I sometimes cause them to have very painful diseases of the throat and stomach; that I am likely to injure their hearts—if they only knew all these things, I say."

"Well, what then?" asked the corn.

"If they only knew these things and acted with the wisdom which they display in respect to other matters, the reign of KING TOBACCO would very soon end."

Just then one of the farmer's men came up and stripped the tall weedstalk of all its leaves.

"These will make fine cigars," the man said.

The corn said not a word, but stood up very straight and waited patiently for its own time of harvest to come.

XXX. TOBACCO.

A WRITTEN LESSON.

Tobacco is a weed.

Tobacco is not a food.

It contains a poison called nicotine.

Tobacco stunts the growth of boys.

Tobacco makes the muscles small and weak.

Tobacco discolors the teeth.

Tobacco costs money that ought to be spent for food.

Tobacco does not feed the hungry.

Tobacco does not protect from the cold.

XXXI. THE BLOOD.

A LESSON TO BE TALKED ABOUT.

You have already learned that every time a muscle is moved, some small portion of it is worn away. The bones, too, lose a little of their substance whenever they are used; but being so hard they change much more slowly than the soft flesh. Since every motion causes a loss of some minute particles of the body, why then does not exercise weaken instead of strengthen us?

When the cover of your ball becomes somewhat worn, if you remove it and put on a new and better one, what will be the result?

When the mainspring of a watch becomes weak by long use, it may be removed and another put in its place, thus making that part of the watch stronger and better than before.

So it is with the parts of your body. When one small particle has become weakened by use, it is taken away only to be replaced by a new and, it may be, stronger and better particle. In one respect, however, this repairing of the body is different from the repairing of a ball or of a watch. While the entire spring of the watch, or the entire cover of the ball, has to be changed at the same time, it is never so with a muscle or a bone or any other distinct part of the body. There the changes are made between very small particles, so small that you could not by any means see the process with your eyes. And so while a muscle is being worn out and repaired all the time, it may happen that months and even years will pass before the whole of the old material has been removed and the muscle is made entirely new.

Of what are these new particles which are used for building up the body made?

You have already been told that the wholesome food which you take into your stomach is, by some wonderful process, changed into particles of blood and flesh and bone, and that these are the particles that are used in repairing the worn out portions of the body. But how do these particles always find their way to the very places where they are needed? When the muscle which moves your little finger needs repairing, how does it happen that a minute portion of the dinner which you ate yesterday, and which has gone through the mysterious change we have spoken of, is there, ready to be placed in position?

I will tell you.

It is the blood that carries these food particles all over the body; and, in a very strange way which we cannot understand, the blood always selects just the right particles for the right place, and, if the body is in good health and not overworked, the mending or repairing is done just at the right time. The blood of growing children carries these particles somewhat faster than they are needed merely for repairing purposes, and hence the size and strength of the muscles and bones and other parts are gradually increased.

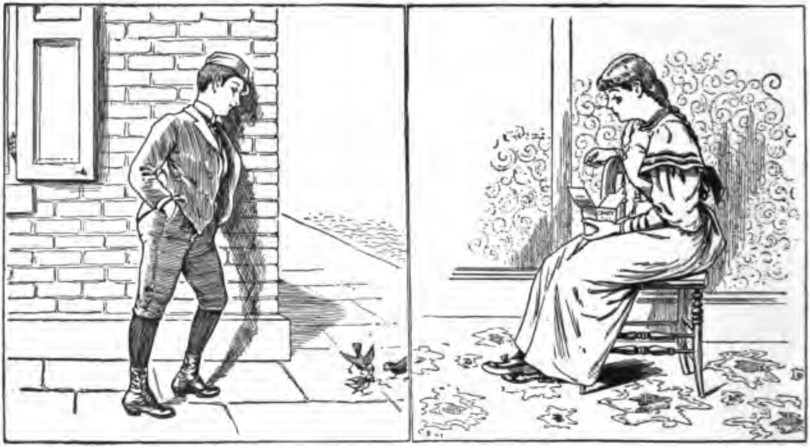
So also is it the case with any part of the body that is exercised. Proper exercise causes the blood to flow faster to that part; the blood carries and puts in place a greater quantity of the building-up materials; and hence that part becomes not only stronger but larger, as in the case of the blacksmith's arm.

Is it not plain to you now why you should always eat wholesome food? why you should eat it properly? and why you should do nothing that will hinder its being properly changed to good red blood and healthy muscle or bone or other necessary substances?

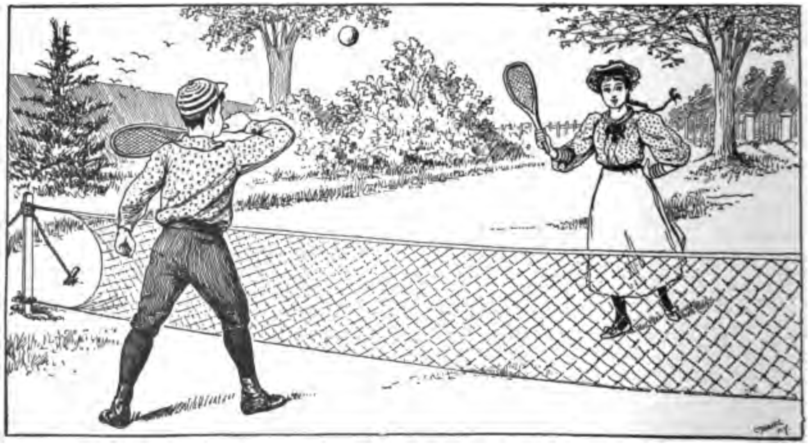
Is it not also plain to you why you should properly exercise your bodies if you wish them to grow strong and symmetrical and be in the highest degree useful to you?

XXXII. A REVIEW.

A PICTURE LESSON.



THESE CHILDREN TAKE BUT LITTLE EXERCISE AND EAT UNWHOLESOME FOOD.



THESE CHILDREN ARE MUCH HEALTHIER AND HAPPIER. WHY?

XXXIII. POISONS.

A READING LESSON.

If a poison of any kind is taken into the stomach it mixes with the food which is there. Whether there is food in the stomach or not, this poison finds its way into the blood. The blood carries it to all parts of the body.

Now, there is this great difference between a food and a poison. The food builds up and strengthens; the poison tears down and destroys.

Some poisons act very rapidly, and if taken into the body cause death in a short time. Others act more slowly but none the less surely. Poisons of this latter kind often seem to give pleasure to those who have taken them, while at the same time they are weakening their powers, hindering the food-particles from doing their work, and paving the way for disease.

The most common poisons of this kind are alcoholic drinks, such as beer, wine, whisky, and brandy.

Men who drink liquor generally become tired sooner than those who do not. They cannot perform any great feats of strength. The reason of this is that the muscles have become enfeebled by the poison, and they are no longer able to do the work that is expected of them.

The muscles of a person who is in the habit of drinking do not act as he wishes—he cannot control them. His hands tremble, his step is unsteady, he often staggers when he tries to walk. The reason of all this is easy to understand. The poison that has found its way into his blood is destroying his strength.

Young people who want to have strong bodies and grow to the full stature of manhood or womanhood, must shun all forms of alcoholic drinks.

Children, do you see the wine,
In the crystal goblet shine?
Be not tempted by its charm;
It will surely lead to harm.
Touch it never,
Fight it ever!

Never let it pass your lips,
Never even let the tips
Of your fingers touch the bowl;
Hate it from your inmost soul—
Truly hate it!
Touch it never,
Fight it ever!

◆

Name some of the best foods.
What do foods do?
What do poisons do?
Name some of the most common poisons.

XXXIV. THE BLOOD-VESSELS.

AN ORAL LESSON.

What is the color of blood?

Is blood thicker or thinner than water?

Look at the back of your hand. Do you see the blue veins running across it underneath the skin?

If you were to cut one of these veins what would flow from it?

We call the veins *blood-vessels*, because the blood flows through them, or, as we say, because they carry blood.

Some of the veins are large, others are very small—so small that you cannot see them.

"LOOK AT THE BACK OF YOUR HAND."

Besides the veins there are other blood vessels which are called arteries. There are about as many arteries as veins, and they are about the same size. We cannot see the large arteries in the hand because they are covered up by the muscles, or concealed between the bones. But there are large arteries running up the side of the neck which, in some persons, can be seen underneath the skin. On the lower side of the wrist, also, there is an artery which is quite close to the skin.

Look at your wrists, and see whether you can not perceive this artery. We will learn more about it after a while.

The blood in most of the veins is of a bluish tint.

The blood in most of the arteries is bright red.

Connecting the veins with the arteries there are other blood-vessels which we call *capillaries.* The word capillary means hair-like; but these vessels are much smaller than hairs, and they are a good deal like veins in their structure. It is in these capillaries that the wonderful process of tearing down and building up is all the time going on.

There are blood-vessels in all parts of the body. Stick the point of the finest needle into a muscle and it will be sure to strike a blood-vessel—either a capillary, a vein, or an artery.

Now, you must know that the blood is all the time flowing through the arteries, the capillaries, and the veins. It never stops a moment, but flows rapidly to and from every part of the body. Its course is through the arteries first; from the arteries it passes into the millions of tiny little capillaries; from the capillaries it is emptied into the veins. What causes the blood to keep thus always in motion? Let us see whether we can learn.

XXXV. THE HEART.

A LESSON TO BE STUDIED.

You have often heard of your *heart*. Put your hand on your left side, a little above the waist. Now keep very still a moment.

"YOU HAVE OFTEN HEARD OF YOUR HEART."

Do you feel anything knocking there, ever so gently—thump, thump, thump, thump? It is the heart beating. Ever since you were born it has been beating there, and it will never stop so long as you live. If it were to cease beating, only for a minute, you would die. Now place the two front fingers of your right hand upon the lower side of your left wrist, just behind the ball of your left thumb. Do you not feel something thumping gently there also? Thump, thump, thump, thump! It beats exactly as fast as the heart. This is what we

"THIS IS WHAT WE CALL THE BEATING OF THE PULSE."

call *the beating of the pulse.* Sometimes you can see the pulse beat.

Now what causes the beating of the pulse?

Out from the heart there flows a great artery, which divides and subdivides into smaller branches that are sent to all parts of the arms and the head, the body and the legs. One of these branches runs quite close to the skin on the under side of the wrist. This is the artery of which something was said in the last lesson.

The heart when it beats, acts like a force pump and sends the blood coursing along through the great artery and all its branches. It is this coursing of the blood through the smaller artery under the wrist that produces the thumping which we call the beating of the pulse.

This thumping may be felt in the large artery of the neck. All the arteries thump when the heart beats.

The pure red blood, laden with the nourishment from the food, is driven by the heart into the arteries and thence into every part of the body. It flows into the little capillaries in the muscles, the ligaments, the bones. In its passage through the capillaries it leaves such of the food-particles as are needed to build up or repair the parts adjoining them.

And now another wonderful thing takes place. The worn-out matter, which has done its work in the body and is now of no further use, is taken into the blood as it flows through the capillaries. It is carried onward into the veins. It is this matter which gives the blood in the veins its bluish tinge.

The action of the heart as it beats is such that it causes all the blood in the veins to flow back toward it, just as fast as it causes the blood in the arteries to flow away from it. This is what we call the circulation of the blood.

Now let us follow the blood as it circulates. Every time the heart beats it sends some blood into the arteries. This blood, as you have already learned, is charged with life-giving substances, some of which have been obtained from the food.

Every time the heart beats, some of this blood is forced from the arteries into the capillaries.

Every time the heart beats, some of the blood flows from the capillaries into the veins; but it is not life-giving blood now. Can you tell why?

Every time the heart beats, some of the blood in the veins is emptied back into the heart. What becomes of it then? You will learn in another lesson.

XXXVI. HOW THE BLOOD FLOWS.

A WRITTEN LESSON.

Here are a few things to be remembered. Write them down.

The blood in the arteries is bright red.

The blood in the veins has a bluish tinge.

The blood in the arteries flows away from the heart.

The blood flows *from* the arteries, *through* the capillaries, *into* the veins.

The blood in the veins flows toward the heart.

The blood in the arteries contains the food-particles for the nourishment and building up of the various parts.

The blood in the veins contains the worn-out matter that is no longer of any use in the body.

The heart acts like a force pump.

It is the beating of the heart that causes the blood to flow through all the blood-vessels.

If the heart should stop beating the blood would stop flowing.

If the blood should stop flowing, what would happen then?

XXXVII. HEART BEATS.

AN ORAL LESSON.

Place your fingers upon your wrist so as to feel the beating of the pulse. Now count the number of beats in a minute.

How often does your heart beat in a minute?

It beats a little faster when one is exercising than when he is quite still. It beats faster when one is awake than when he is asleep. It generally beats faster when one is sick than when he is well. Sometimes in cases of fever it beats very fast and sends the blood coursing through the arteries and veins at a rapid rate.

The heart of a child beats faster than that of a grown person. The heart of a woman usually beats faster than that of a man. At every beat of the heart impure blood is emptied into one side of it from the veins, and pure blood is forced out of it from the other side into the arteries.

If the heart beats too fast, the blood will be sent too rapidly through the blood-vessels.

If the heart beats too slowly, what will be the case?

Did you ever notice that when you played too hard your heart would beat very fast and you were obliged to stop and rest?

Sometimes when one is greatly excited or frightened, the heart beats very hard.

Strong tea or coffee, when drunk to excess, often sets the heart to fluttering. When any one finds that either of these drinks is harmful in this way, he should at once stop its use.

Alcohol causes the heart to beat too fast. It sometimes causes a troublesome and dangerous fluttering of the heart, called palpitation. It sometimes weakens the heart so much that it can not do its work as it should.

The use of tobacco often affects the heart in this way. Boys who are in the habit of smoking cigarettes are troubled just so. Their hearts do not beat regularly, but first slowly and then rapidly. Sharp pains in the left side tell them that the poison is at work.

Boys may live through all this and become men—but they are not likely to become strong, healthy, noble men.

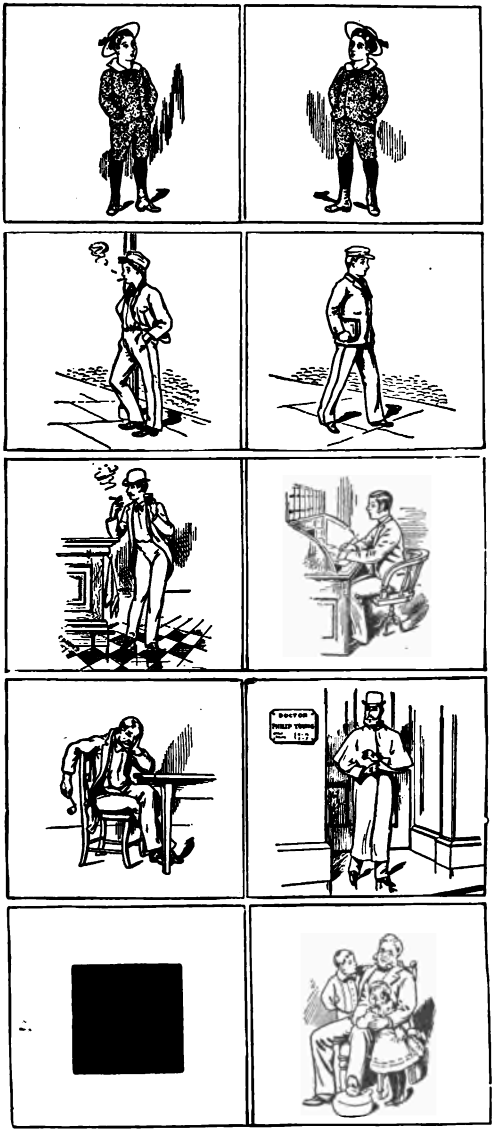
The best rule is this:

"*Shun all poisons.*"

XXXVIII.

THE TWIN BROTHERS.

A PICTURE LESSON.



Frank began to smoke when he was twelve. Philip never used tobacco nor drank strong liquor of any kind.

The first pictures show the boys at ten years of age; the second, at sixteen. In the third pictures twenty-five years have passed; in the fourth, forty years; and in the fifth sixty years.

XXXIX. WOUNDED BLOOD-VESSELS.

A LESSON TO BE STUDIED.

If you should cut your finger slightly what would happen?

What would you do to stop the bleeding?

If only a small blood-vessel is cut, the flow of blood will not be likely to give much trouble. If necessary, bind a light bandage over the wound so as to press the parts together. The blood when it comes in contact with the air, soon clots, or hardens. It fills up the pores of the bandage, it blocks up the open ends of the wounded blood-vessel so that no more blood can escape.

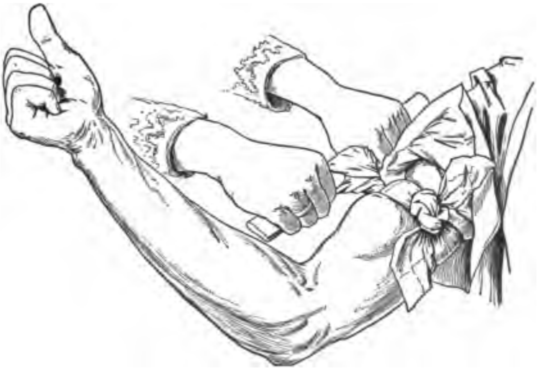
"WHAT WOULD YOU DO TO STOP THE BLEEDING?"

If it were not for this clotting of the blood the bleeding could not be easily stopped. Even the slightest cuts would be dangerous.

When a large blood-vessel is severed, as sometimes happens, the blood flows out very fast, and a mere bandage is not sufficient to stop the bleeding. Clots of blood are formed as before, but they are pushed aside by the strong flow. Something else must be done, or the wounded person will bleed to death.

Now, in the treatment of a severe wound of this kind it is very necessary to know whether the vessel is a vein or an artery. It is most likely to be a vein, for large veins are oftener cut by accident than large arteries. Can you tell why?

The blood from a vein flows in a steady stream. The blood from an artery flows in jets, spurting out strong at each beat of the heart. The color of the blood from a vein is not the same as that of blood from an artery. Can you tell the difference?



"TIE IT AROUND THE ARM."

By remembering what I have just told you, it will not be hard to learn whether it is a vein or an artery that is bleeding. Now if it is a large artery in the arm, take a strong bandage—a piece of rope, or a handkerchief rolled up tightly, or a stout strip of cloth will do. Tie it around the arm an inch or so from the wound. Arrange the knot which is made in tying so that it will press directly upon the wounded artery. Then pass a stick underneath the bandage on the opposite side of the arm, and twist it until the bandage is very tight indeed. This will perhaps check the flow of blood until the doctor comes.

But here is a very important thing to think of at the start: *On which side of the wound shall you tie the bandage?*

In which direction does all the blood in the arteries flow?

The blood never flows backward. Therefore, the blood from a wounded artery always escapes from that part of the wound which is nearest to the heart. And so it is easy to remember this rule: *In the case of a wounded artery, always tie the bandage between the wound and the heart.*

The bleeding of a wounded vein may be checked in the same way, only remembering this rule: *In the case of a wounded vein, always tie the bandage on the side of the wound away from the heart.*

In which direction does all the blood in the veins flow?

Slight wounds, if they are properly cared for, soon heal. Did you ever think how this healing is done?

No sooner is the bleeding stanched, than the parts begin the work of closing up the wound and making good the damage that has been done. The little arteries hasten to bring the food-particles that are best fitted for the repairing of the parts. In some wonderful way which no man can understand or explain, these food-particles are made into new muscle, or new tendon, or new skin, or new bone, as the case may be.

This new matter being deposited in the place where it is needed, the wound is healed as we say. Very often the healing is done so perfectly that hardly a scar is left to show where the new matter was placed. But in case of very deep wounds, scars almost always remain to show where they were.

As a general rule, wounds are easily and quickly healed if the blood which the arteries carry is perfectly pure. For in that case, there is nothing to hinder the proper placing of the food-particles which are used in building up the injured parts.

But, suppose some poison has found its way into the arteries and is mixed with the food-particles in the blood—what then is the case?

You have already learned that poisons tear down and destroy, and that they hinder the work of the food, whose business it is to build up and repair. Why are the wounds of persons who indulge in alcoholic drinks so long in healing?

Sometimes the alcohol in the blood-vessels of a drinker has so changed the blood that it can not form a clot when flowing from a wound; and in such case the person wounded is likely to bleed to death. In some hard drinkers the alcohol seems to act differently; and the blood becomes clotted while still in the veins, thus hindering the circulation.

Why, in the case of persons who use tobacco, are the smallest cuts and scratches sometimes so troublesome and hard to cure?

Poisons of any kind, when contained in the blood, hinder it in its work. To be in perfect health, one's blood must be pure. Pure blood has the power of resisting disease; but when alcohol is mixed with it it loses this power.

For this reason, drinkers of strong liquor are more likely to become sick than they would be if they were not drinkers; and when they are once sick, it is a long time before they become well again.

XL. HOW TOMMIE SAVED ETHEL.

A READING LESSON.

Tommie was about twelve years old, and his sister Ethel was some four years younger. One day in midsummer they went out into the hayfield to see the harvesters at work.

The sun shone, the sky was blue, soft fleecy clouds floated overhead. The birds sang among the trees. The smell of the new-mown hay filled the air. Both the children were very happy.

At noon the haymakers went to the other end of the field to eat their dinners in a little grove where there was a spring of water. They left their scythes behind them, close by the long grass that was to be cut.

"I believe I could mow as well as Patrick, if I had only a scythe," said Tommie.

"I would like to see you try," said little Ethel.

"I *will* try," said Tommie. "Patrick won't care."

So he took up Patrick's scythe and began to mow.

He was delighted, and so was Ethel. How smoothly the sharp blade glided through the grass! How prettily the stalks of timothy and the tall daisies that grew among them toppled over and tumbled to the ground! Ah, it was a fine thing to be a mower!

But soon Tommie came to a place where the grass had been blown down and was badly tangled. The scythe would not slip through so easily here. He gave a very strong stroke, and the long blade glanced over the grass instead of cutting through it.

There was a sharp scream from Ethel. Pleased with her brother's fine mowing she had come too near. There was a deep gash on her leg just above the ankle, where the sharp scythe had struck her.

She fell upon the ground, fainting with fright. The blood gushed out in an ugly stream, all over her shoe and stocking. The grass and the ground were dyed red with it.

Some boys would have rushed screaming across the hot field to fetch the haymakers. In that case Ethel would have bled to death before any help could come. Tommie did very differently.

"Don't cry, Ethel," he said. "I will help you."

He looked at the ugly wound, and saw at a glance that the case was a serious one. He had learned at school that artery-blood is a bright red, and that vein-blood is purple, or that it has a bluish tinge. He had learned, too, that a cut artery is much more dangerous than a cut vein.

The blood that flowed from Ethel's leg was red. There was no doubt of that; it was as red as red could be, and it came out in quick little jerks as if in haste to escape.

Off came Tommie's neck-tie. In less time than we have been telling about it, he had bound it round the leg near the wound, and above it. The knot was tied as nearly over the artery as possible, and drawn very tight. Then the blood stopped flowing except from a few small veins; and even these were soon filled with clots so that scarcely a drop oozed out. Little Ethel's life was saved.

And now Tommie worked with less haste. He unbuttoned her shoe and took it off. Then with his jack-knife he slit that part of stocking that was above the wound and removed it with great care lest he should disarrange the bandage and set the blood to flowing again.

"Now be very still, Ethel," he said, "and I will bind up the ugly wound."

He tore her little white apron into strips two or three inches wide. Then, pressing the gash together gently with the fingers of his left hand, he wound the strips, one upon another, around the wounded part of the limb. When he had finished, not a drop of blood could escape. Ethel looked at the white bandage, and dried her tears.

"You are my own brother, Tommie," she said, "and you didn't mean to hurt me."

Then Tommie halloed and shouted till the haymakers heard him; and they came and carried the child home, where she had to lie very still till the parts that had been cut—the muscles and the artery and the small veins—had joined together again. In the meantime the blood had to go through other arteries by a roundabout way to reach the ankle, and in the capillaries the building-up forces were very busy at work, choosing and placing the right materials in the right place.

Everybody was pleased with Tommie for having saved Ethel's life; and Tommie himself felt proud because he had succeeded so well.

"If I had not kept cool, it might have turned out differently," he said.

"Yes," said his father. "In accidents of this kind, one must try never to lose his presence of mind."

XLI. THE BLOOD IN THE VEINS.

AN ORAL LESSON.

What is the color of the blood in the veins?

Toward what place does the blood in the veins flow?

The veins are all the time carrying impure blood to the heart. Even in the healthiest persons who eat only the most wholesome foods, this blood is always impure. It is impure because it contains the useless, worn-out matter that has been taken from the muscles, the skin, the tendons, and the bones.

Why does not the heart become filled with this impure blood?

Why does not the blood in the arteries become impure also?

Why is not the whole body poisoned by the impurities contained in the blood of the veins?

It is plain to be seen that there must be some way of getting rid of these impurities. There must be some way of driving these useless particles of matter out of the body. There must be some way of changing the vein-blood into pure artery-blood. If all this were not done, you could not live an hour: the artery-blood would become clogged with impurities; it could not carry the nourishing food elements to the places where they are needed; there could be no building-up of the worn-out parts. Where and how is this wonderful process of blood purifying carried on?

The veins empty their blood into the right side of the heart. From the left side of the heart, pure, life-sustaining blood is forced into the arteries. Yet it is not in the heart that the blood is changed from impure to pure.

"SIT VERY ERECT."

The vein-blood when it is emptied into the heart does not remain there; neither does it flow at once to the other side where the great arteries have their beginning. By the next beat of the heart it is forced out again and made to flow into the lungs.

Lungs? What are they? You will learn in good time.

Sit very erect with your hands down before you. Now draw a long breath. Did you notice how the upper part of your body swelled out as you drew in the air?

We call this upper part of the body the *chest*. It is enclosed on each side by a number of slender bones which are bent a little like the hoops of a barrel.

What are these bones called?

All the ribs are joined to the backbone. Some of them are also joined in front to the breast-bone.

Breathe the air out again and see how your chest becomes a little smaller in size.

Now draw a long breath again. Notice how the chest swells and the ribs move outward. A movement like this takes place every time you breathe, although you do not often notice it.

How often do you breathe in a minute?

Do you ever stop breathing?

Could you stop breathing if you were to try?

You can stop a very little while; but you must never try to stop long.

What two things do you do when you breathe?

This taking the air into the lungs and then allowing it to escape is called breathing. A single act of this kind is called a breath.

Do you take the air in through your mouth or through your nose? How does it get into your body, or chest?

In the next lesson, you will learn something about the lungs.

XLII. BREATHING.

A LESSON TO BE STUDIED.

There are two lungs in the chest, one on each side. They are so large that they fill the greater portion of the chest. They are very light, for they are a little like a sponge, full of thousands of very small pores. But the pores of the lungs are not open like the pores of a sponge. More properly they are not pores, but little cells or chambers; and, because they are most of the time filled with air, they are called air cells.

"PUT YOUR HAND ON THE FRONT PART OF YOUR NECK."

These air cells connect with one another, somewhat in the same way as the rooms of a house, and at last they open into a large tube. There are two of these tubes, one for each lung, and they unite at the middle of the breast forming a still larger tube. This larger tube extends up the front part of the neck, and opens into the back part of the mouth.

Put your hand on the front part of your neck, just below your chin. You can feel this tube there. It is very strong. You can feel the bone-like rings that surround it to give it strength. It is often called the *throat*, although there is another throat behind it through which the food passes to the stomach. A better name for it is the *windpipe*.

It is through the windpipe that the air is taken into the chest.

Take three deep breaths, slowly: I-n, o-u-t; i-n, o-u-t; i-n, o-u-t.

Did you notice the motion of the ribs? Did you notice how, as I said "In," they moved outward and made your chest larger? If you did not, then take another deep breath:—I-n, o-u-t.

"TAKE THREE DEEP BREATHS SLOWLY."

When your chest became larger, the lungs were expanded so as to keep it filled all the time; and the air rushed through the nose and windpipe into the little air cells in the lungs, so as to leave no space empty. That is the way in which we "take breath," as we say. When the ribs fall back to their place again, and the chest becomes as small as before, this air will be forced out of the lungs and will escape through the windpipe and the nose; and that is the way in which we "blow our breath," as is sometimes said.

Now there are certain muscles whose duty it is to keep the ribs always moving outward and inward, causing the chest to expand and then become small. These muscles act all the time whether you think of it or not; and so, whether you are at work or resting, awake or asleep, you never stop breathing. The air is all the time rushing first into the lungs, then out again—i-n, o-u-t; i-n, o-u-t; i-n, o-u-t. When you are not thinking about it, you breathe twenty or more times every minute.

You can hold your breath a little while, if you try; but it is not alway wise to do this, for it may do harm to the lungs or to some of the delicate blood-vessels in the little air cells. Sometimes persons have held the breath so long that they lost the power to breathe again, and so death came.

It is a good thing, however, often to take a good, deep breath so as to fill your lungs full of fresh, pure air; and then, without holding it, to breathe it out slowly again. In this way the lungs are strengthened, and the chest becomes stronger and larger.

Did you ever notice when you were playing very hard that the breath would come much faster in spite of you? Sometimes you feel as though you cannot breathe fast enough, and then you say you are "out of breath."

XLIII. HOW THE BLOOD IS CHANGED.

AN ORAL LESSON.

Why do we breathe?

What would happen to us if we could not breathe?

Now, let us try to remember some things that we have learned about the blood.

What kind of blood do the veins carry?

What has caused this blood to be impure? Or, what does it contain that makes it impure?

To what place do the veins carry the impure blood?

Why does not the heart soon become filled with it?

If the impurities in the vein-blood should become mixed with the artery-blood, what would happen?

What must be done in order to prevent this?

Into which side of the heart is the impure vein-blood emptied?

Does it remain there?

Does it flow at once to the other side of the heart where the great arteries have their beginning?

If it did do so, what would happen?

What really does happen to it at the next beat of the heart?

(You have been told what happens. If you have forgotten, turn back to page 98, and read what is said there.)

Into what does the blood flow when it is forced out of the right side of the heart?

Where are the lungs?

With what are they full?

But I must tell you now that the walls of each one of these little air cells, or chambers, as we may call them, are full of very small blood-vessels. Only a very thin partition separates the blood in these vessels from the air in the chambers. This partition is so thin, indeed, that the impurities in the blood pass through it and become mixed with the air. At the same time one of the elements of the air, which we call *oxygen,* passes through, the other way, and becomes mixed with the blood in the veins. All this is very wonderful and we cannot tell just how it is done. But, what happens then?

This is what happens to the air:—

During its short stay in the air chambers of the lungs, it has become full of the impure matter that was in the blood. It has also parted with a portion of its oxygen. If it were to remain in the lungs, the impure matter would find its way back to the blood and would act as a poison in the body. And so the chest contracts, you breathe outward, and the foul air is driven from the lungs.

This is what happens to the blood:—

Having lost its impurities, it is now pure again. It has already been enriched with the nourishing food-particles that have been prepared for it in the stomach. It is now further enriched by the life-giving oxygen that has come to it from the air. It loses its bluish tinge, and becomes a bright red. It is ready to be carried back to the heart again. But this time it is emptied not into the right side of the heart, but into the left.

Then the heart beats strong and quick, and the blood which was so lately in the veins is forced out into the great arteries. Its nature has been changed. Instead of being a carrier of decayed and useless matter, it is now loaded with rich nutriment for the strengthening and building up of the various parts of the body. It has derived this nutriment from two sources: from the food that was taken into the stomach, and from the air that was taken into the lungs.

Now try to answer these two questions:

Why do we eat?

Why do we breathe?

XLIV. THE BODY'S CARRIER.

A WRITTEN LESSON.

Write the following lines and try to remember them.

1. *The blood is the carrier for the body.*

2. *It carries nourishment to the parts that are in need of it.*

3. *It carries material for the repair of the muscles, the bones, the tendons.*

4. *It carries away the worn-out matter that is no longer of any use to the body.*

5. *It carries oxygen which aids in the building up of various parts and helps to keep the body warm.*

6. *It sometimes carries poisons that have been placed in its way.*

7. *If made to carry unwholesome food or any poisonous substance, it is likely to become diseased and unable to do its proper work.*

8. *If made to move too rapidly, or to carry too heavy loads, it is likely to lose some of its carrying power, and then it cannot do its work well.*

9. *If loaded with too many impurities it cannot remove them all as soon as it should; and so some are allowed to remain, causing illness and distress.*

XLV. POISONS IN THE BLOOD.

A LESSON TO BE REMEMBERED.

The breath of any person who is addicted to the use of alcohol is sure to betray him. Why is this?

Much of the poisonous alcohol that is taken into the stomach and finds its way into the blood is driven out of the body by the breath. If this were not so, persons who use alcoholic drinks could not live long. Their blood would become so full of the poison that it could not do any of its work.

But the vein-blood contains enough impurities to be removed through the lungs without the addition of alcohol. When the power of the lungs is overtaxed by requiring them to do more than they are well able to perform, they become diseased. And so persons who are in the habit of using alcoholic liquors are likely to be troubled with shortness of breath; they breathe quick and fast, and easily become tired; and many of them are afflicted with troublesome and dangerous diseases of the lungs.

Alcohol also acts upon the heart. Sometimes it causes it to beat irregularly; sometimes to beat very fast indeed. The blood is thus sent irregularly to those parts that are in need of nourishment.

Very often alcohol causes a deposit of fat to be formed around the heart. A great part of the heart itself is changed to fat, and hence it is weakened and becomes unable to keep the blood moving at the proper rate through the blood-vessels. This condition is almost sure to end in death.

Alcohol always has a tendency to interfere with the proper flow of the blood through the different parts of the body. It sometimes causes too much blood to gather and remain for a time in the lungs, the heart, the stomach, or the brain. In such cases those parts cannot do their proper work, and the health of the whole body suffers on that account.

Very often alcohol causes an unnatural quantity of blood to collect in and flow through the veins and arteries of the skin. And so, the nose and cheeks of the drinker become purplish red; his face is swollen and covered with pimples and blotches; his eyes are watery and bloodshot.

The breath of a person who is in the habit of using tobacco is almost sure to betray him. It tells of the presence of tobacco in the lungs and in the blood.

If any poison is in the blood, it seldom fails to find its way to the heart. Tobacco, containing poisonous nicotine, very often injures the heart. Tobacco frequently causes the heart to become weak, so that its beats are irregular and it is unable to send the blood coursing through the veins rapidly and freely.

Users of tobacco are sometimes greatly troubled with what is called "tobacco heart." Any exertion causes the heart so diseased to beat rapidly; and even moderate exercise will set it fluttering in a way that is very distressing and sometimes alarming. It is thus that palpitation of the heart is often produced.

Poisons may enter the body in various ways. As you have already learned, they are oftenest taken into the stomach and thence are conveyed, like the food elements, into the blood. They circulate through the blood-vessels and are sometimes removed from the body partly through the lungs and partly through other channels.

Poisons sometimes enter the body through the lungs, as when impure air or poisonous gases are breathed.

Poisons sometimes enter the body through the pores of the skin or through wounds, as in the case of bites from poisonous animals. Some substances are harmless when taken into the stomach but are deadly poisons when breathed into the lungs or made to enter the blood directly through wounds.

XLVI. WHO KILLED TOM ROPER?

A READING LESSON.

Who killed Tom Roper?
"Not I," said New Cider:
"I couldn't kill a spider—
I didn't kill Tom Roper."

"Not I," said Strong Ale:
"I make men tough and hale—
I didn't kill Tom Roper."

"Not I," said Lager Beer:
"I don't intoxicate. Do you hear?
I didn't kill Tom Roper."

"Not I," said Bourbon Whisky:
"I make sick folks well and frisky—
The doctors say; and don't they know
What quickens blood that runs too slow?
I didn't kill Tom Roper."

"Not I," said sparkling old Champagne:
"No poor man e'er by me was slain;

I cheer the rich in lordly halls,
And scorn the place where the drunkard falls—
I didn't kill Tom Roper."

"Not I," said Holland Gin:
"To charge the crime to me is sin—
I didn't kill Tom Roper."

"Not I," spoke up the Brandy strong:
"He grew too poor to buy me long—
I didn't kill Tom Roper."

"Ha! ha!" laughed old Prince Alcohol:
"Each struck the blow that made him fall;
And all that helped to make him a toper,
My agents were to kill Tom Roper!"

—*The Little Corporal.*

There are many kinds of alcoholic liquors.

The most common kinds are named in the verses above.

Some contain much more alcohol than others, and hence do much more harm.

But it is unsafe to use any kind of alcoholic liquor; for the habit of drinking even the least harmful is sure to lead to a desire for other and stronger drinks.

XLVII. THE NEED OF PURE AIR.

AN ORAL LESSON.

Where is the vein-blood purified?

What becomes of its impurities?

What change takes place, at the same time, in the air that is in the lungs?

What kind of air is that which is breathed out from the lungs?

What kind of air is that which is taken into the lungs by breathing?

If impure air should be taken into the lungs, would the blood be so readily purified? Why not?

If the air which is taken into the lungs has not its proper amount of oxygen will it give to the blood all the nourishment that it needs? Why not?

What kind of air then ought we always to breathe?

Where must we go to find the purest air?

Why is air that has once been breathed unfit to breathe again?

When several persons are together in a close room for some time, what change takes place in the air that is in the room?

Is it well for several school children to sit for an hour or two in a very close room with all the doors and windows closed?

If the windows should be opened would pure air come in from outside?

If the weather is too cold to allow the doors or windows to be opened, how then may pure air be admitted?

Any method for supplying fresh air in rooms is called *ventilation.*

The breathing of impure air often causes headache, and sometimes severe sickness.

If upon rising in the morning you have headache and a bad taste in your mouth, it is pretty certain that your room was not well ventilated. Many people are made very sick by sleeping in close rooms.

Gas from burning coal is poisonous when breathed. So also is the gas that is used for gas-lights. When any substance of this kind is taken into the lungs it hinders the blood from being purified.

Sometimes a person falls into deep water and is drowned. He is drowned because he cannot get air to breathe. The water rushes into his nose and mouth and even through the windpipe into his lungs. No air can enter the lungs to purify the blood; and so death soon comes.

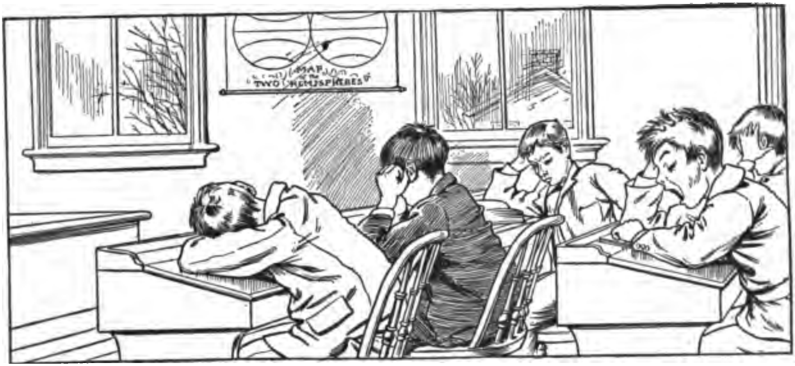
XLVIII. AIR AND FOOD.

A WRITTEN LESSON.

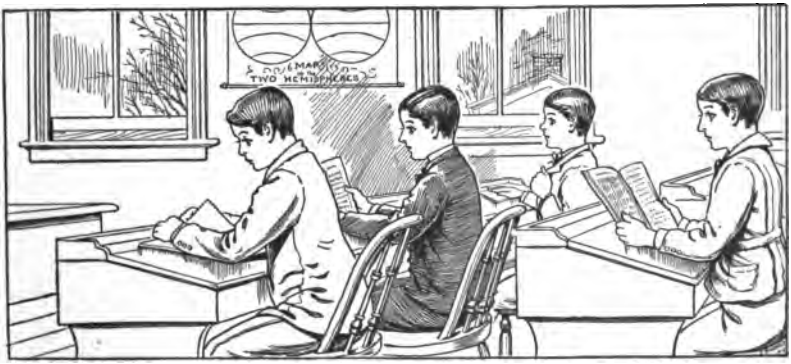
In order to be strong and healthy,
we must have wholesome food, and
breathe pure air.
Unwholesome food causes sickness.
Impure water causes sickness.
Impure air causes sickness.
Poisons taken into the stomach cause.
disease and death.
Poisons taken into the lungs cause
disease and death.
To be strong and healthy, one should
avoid all kinds of poisons.

XLIX. VENTILATION.

A PICTURE LESSON.


MAP of the TWO HEMISPHERES

These boys have been sitting for an hour or two in a close room. How do you think they feel? Why do they feel so? What can be done to make them feel better?


MAP of the TWO HEMISPHERES

These boys have been sitting for an hour or two in a room that is well ventilated. Why do they look so bright and happy? How would they soon look if no pure air could come into the room?

L. THE BODY'S COVERING.

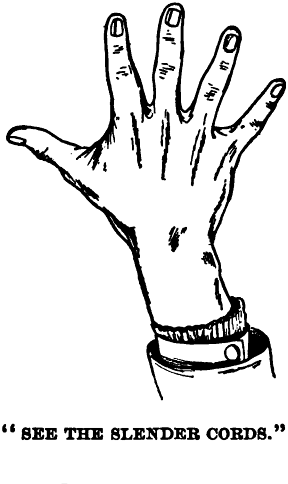
A LESSON TO BE TALKED ABOUT.

Look now at the back of your hand.

See the slender cords, or tendons, which pass up from the wrist to each finger.

See the blue veins which run in all directions underneath the skin.

If the skin were stripped off the back of your hand, what would happen to these veins? What would happen to the long, white tendons? What would happen to the tender little muscles which lie there?



"SEE THE SLENDER CORDS."

The chief use of the skin on the back of the hand, therefore, is to protect the flesh, the blood-vessels, and the tendons which lie underneath it.

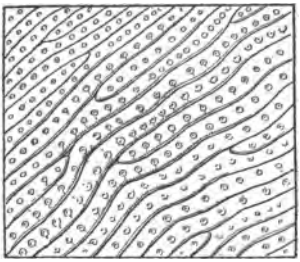
Feel of your cheeks—what a delicate covering they have! A very little exercise will set them to glowing. The blood-vessels are not very far from the surface there. If it were not for the protection which the skin gives to these vessels and of course to the flesh which contains them, there could be no beauty of face or feature.

Although the chief use of the skin all over the body is to protect, yet it sometimes aids also in imparting beauty to the face, the arms, the hands. It can not be beautiful, however, unless the blood which flows through the delicate blood-vessels beneath it is healthy and pure. And, in order that this may be so, one must have, as you have already learned,

(1). Wholesome food to eat,
(2). Pure water to drink,
(3). Pure air to breathe,
(4). Healthful exercise.

The eating of unwholesome foods, of too much meat, of too many sweetmeats, or of rich pastry, is likely to cause diseases of the skin—pimples, boils, and other eruptions. The faces of persons who use alcoholic liquors soon begin to show the effects of the poison which they take into their blood. Their cheeks become of a reddish-purple hue, their noses are also red, their eyelids are inflamed, and the skin is full of unsightly pimples and blotches.

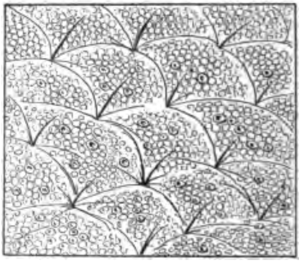
Tobacco often has a harmful effect upon the skin. Even coffee and tea, when used to excess, have a tendency to injure its delicate texture, and sometimes to impart to it an unnatural color.



PORES OF THE SKIN SEEN THROUGH A MICROSCOPE.

But the skin does something else besides protect and beautify. *Like the lungs, it helps to purify the blood.*

If you were to look at any part of the skin through a microscope, you would see that it is full of very fine pores, or openings, like little tubes. Through these pores some part of the impurities of the vein-blood is all the time being carried away. You know that when you are very warm, or when you exercise briskly, the skin often becomes covered with moisture. You call this moisture *sweat,* or *perspiration.* Now, the sweat is only certain impurities that have escaped from the blood through the pores of the skin.



THE SKIN ON THE PALM OF THE HAND SEEN THROUGH A MICROSCOPE.

This sweat, or perspiration, is oozing from the pores of the skin all the time, but not so fast that you can see it. Except when you have been exerting yourself in some way, or have become overheated, it passes off in the form of unseen vapor, and is unnoticed.

If the skin did not help the lungs in this way, the lungs would be overworked, and severe sickness would follow. Sometimes, when a person is exposed suddenly to a cold draft of air, the pores of the skin become closed and can not do their proper work. Then the whole body suffers, the lungs are overburdened, and a troublesome cough, with headaches and pains in the limbs, tells plainly that the blood in the veins is not being properly purified. This is what is commonly called *a cold.* If not attended to, it may lead to serious sickness.

A cold may be cured by doing something to reopen the pores of the skin so that they will do their proper work again. A hot foot-bath, or the drinking of hot teas—anything that will produce a sweat—will often do this.

A good rule to remember is this: *Avoid exposure to cold drafts when you are heated.* If you are careful to do this, you will not be so likely to "take cold." Another good rule is: *Keep the feet dry and warm.*

LI. THREE RECIPES.

A LESSON TO BE WRITTEN.

I. *To have a fair and handsome face*—
Eat wholesome food,
Drink pure water,
Breathe pure air,
Take plenty of exercise,
Be good and kind.
II. *To have a strong body and a graceful form*—
Eat wholesome food,
Drink pure water,
Breathe pure air,
Take plenty of healthful exercise,
Stand erect when standing, and sit up straight when sitting,
Never use tobacco in any form,
Never drink alcoholic liquors.
III. *To live as happily as one would wish*—
Take good care of the body,
Exercise the muscles,
Avoid needless exposure to disease,
Avoid poisons,
Shun all bad habits.

LII. CARE OF THE SKIN.

A LESSON TO BE STUDIED.

Since impurities are all the time oozing from the pores of the skin, it is very necessary that the skin should be kept clean. Sometimes, when this is neglected, some of the pores become clogged with impurities and can no longer do their work. Then, of course, the blood is not well purified, the lungs are overworked, and sickness follows.

To keep the skin clean and healthy, one should bathe often. A good bath every day would be a help to most people. It would keep the pores of the skin open and in a healthy condition so that they could do their work well. The blood could then rid itself of impurities without overtaxing the lungs, and the health of the whole body would be improved.

Even a sponge-bath with a basin of tepid water is better than none. After bathing, rub the body briskly with a towel until the skin is made to glow with the warm blood coursing through the veins.

But in bathing, or even in washing the face, do not use too strong soap. Such soap is apt to injure the skin. Use only the purest soap, and no more than enough to cleanse the skin.

Burns and scalds act in such a way as to destroy the outside layer of the skin. Sometimes they are so severe as to destroy both the outside and the inside layer. You know how painful a burn or a scald always is. Cover it as quickly as possible with something that will keep the air out. Sweet oil, linseed oil, or even dry flour is good for this purpose.

As soon as the pain is allayed, the burned or scalded part begins to heal. Fresh materials are brought to the right place by the blood, and the work of repairing is carried on without delay. In a few days a new skin has been formed and has taken the place of that which was burned. If only the outer layer was burned, then it is healed so perfectly that it looks just as it did before. But if the skin was burned all the way through, it is more difficult to heal, and a scar is commonly left.

Sometimes the skin is cut. Sometimes it is blistered. In most cases when the wound is but slight it will heal without a scar, if it is properly cared for.

When one's shoes do not fit properly, they often injure the skin over the joints of the toes, causing it to become hard and very painful, and forming what is commonly called corns. To avoid corns: Wear shoes that fit perfectly; let the leather be soft and pliable and not too heavy.

LIII. PROTECTORS OF THE BODY.

A WRITTEN LESSON.

Write the following, together with anything else that you know about the protectors of the body:

The skin protects the muscles, nerves and blood-vessels. It serves as a covering for the entire body.

The hair on our heads helps to protect the skull and brain from too great heat or cold. It sometimes also serves as a protection from blows.

The finger-nails protect the tips of the fingers. They also make it easier for us to pick up small objects.

Some of the bones serve to protect the parts which they enclose.

To be healthy one must be cleanly.

The face and hands should be kept clean at all times.

The body should be bathed often.

The hair should be combed and brushed and kept always clean.

The nails should not be allowed to grow too long, and they should be kept clean.

LIV. THREE FRIENDS OF THE BODY.

A READING LESSON.

The body has three friends whose duty it is to tell it of its wants and warn it of danger. These friends are never seen. They never make themselves known except in case of need. Without them we would be in constant danger of destruction. Yet we do not like them; and when they make themselves known, we use every effort to get rid of them as soon as possible.

Do you think that we are ungrateful to treat our friends in this way? Friends though they are, if we could not drive them away we would soon die. They make their presence known only in order that we shall do something to silence them.

The names of these three friends are Hunger, Thirst, and Pain—and unpleasant fellows they are indeed.

Hunger tells us when the body is in need of food; and Thirst, his brother, tells us when it is in need of drink. If it were not for Hunger, the body might wear away and die before we would think of supplying it with matter for the repairing of the worn-out parts. If it were not for Thirst, the blood might become thick and hot, it might almost dry up in our veins before we would think of taking a drink of water to keep it in a liquid state ready to flow freely through the arteries and veins.

These friends are always ready, then, to remind the body of its duty to itself. If their warnings are heeded they go silently away; if not, they keep on calling louder and louder until they are joined by the third friend, Pain, and then all three demand to be obeyed.

Pain is one of our best friends, for it is he who tells us when any part of the body is injured, and warns us to protect it before it suffers greater injury. When a child puts his hand in hot water, Pain tells him to remove it quickly before the skin is blistered and the delicate muscles harmed. When your penknife slipped and cut a deep gash in your wrist, Pain called to you, and bade you stanch the flow of blood as soon as possible. When you forced an ill-fitting shoe upon your foot, Pain called to you to beware lest it should crowd and deform the bones of the toes or cause them to become covered with unsightly corns. When your head ached, it was Pain telling you that you had taken cold or that your stomach was disordered.

But how does Pain tell us of these things? How is it that he sends his messages from every part of the body and makes them understood by us?

It is all done in so wonderful a manner that we cannot fully understand it; and yet it is necessary that we should learn something about it.

You know that the thinking part of the body—the part that is we, ourselves—is in the brain; and you know that the brain is in the head. Suppose you step upon a sharp nail and injure your foot, Pain sends the news at once to your brain—and you command the muscles of your leg to remove your foot as quickly as possible from its painful position. All this is done in a moment, and before you can count "one," the foot is jerked away. How?

The *nerves* carried Pain's message to the brain, and made you understand what was happening. Other nerves carried your message to the muscles of the leg and foot, and made them act instantly. There are nerves extending to every part of your body. Most of them are very small — so small that you cannot see them; but the larger ones appear not unlike long, white threads.

All through the skin and in most of the muscles they lie so thickly that they may almost be said to touch one another. You can not prick your finger with the finest needle without injuring one or more of these tiny nerves. These nerves are the telegraph wires which carry messages between our selves; that is, between our thinking part, which is in the brain, and the various parts of the body.

There are two kinds of nerves—one which carries messages *to* the brain, and one which carries messages *from* the brain to the muscles. There are also nerves which seem to act independently of thought, and about which you will learn at some future time.

The brain is all the time sending different messages to the various parts of the body. When you wish to lift your finger, the brain, through the nerves, informs the proper muscles of your wish. Nearly every motion of the body is made by command of the brain through the nerves.

Your other good friends, Hunger and Thirst, also send their warnings to you through the nerves. But, while Pain may be present in every part of the body, Hunger and Thirst dwell chiefly in the stomach, the throat, and the mouth.

These three friends of the body are closely related one to another. In fact, we might say that Hunger and Thirst are only different forms of pain.

LV. FALSE FRIENDS.

A LESSON TO BE REMEMBERED.

When a person acquires the habit of drinking alcoholic liquors, he gives way to false friends. Among these false friends, one of the worst is a depraved kind of Thirst which keeps calling all the time for more and more liquor. This kind of Thirst can never be satisfied; it will not be driven away. The more alcohol one drinks, the stronger does the thirst for it become.

This is why so many persons become drunkards. This is why it is never safe to drink even one glass of alcoholic liquor. Before he is aware of it, a young man often finds himself the slave of this Thirst; he cannot escape from it, try as hard as he may.

Alcohol acts directly on the nerves and brain. It renders the nerves unable to do their work properly. It makes them weak and irregular in their action. It makes them unable to control the muscles of the body.

The man who is addicted to its use staggers when he tries to walk; his hands tremble; he falls down and cannot rise. Alcohol has taken away from him his nerve-power.

Often, when a man has given way to his depraved Thirst, his brain becomes filled with strange fancies; he does not know his own friends; he loses all self-respect; he forgets that he is a man, and grovels in the street, making himself an object of pity and disgust. Alcohol has stolen away his senses.

It is much the same way with tobacco. Men who have gotten into the habit of using it are never satisfied without it. A false Hunger causes them to continue its use; to drive that false Hunger away would require a great struggle, and but few men who have become the slaves of tobacco are ever strong enough to undertake it.

And so tobacco gets control of the nerves, and makes them unable to regulate the action of the muscles. Users of tobacco are often troubled with nervous diseases. The nerves of the stomach are affected, and the food is not properly changed. The nerves of the heart are affected, and the blood is not properly purified. The whole body suffers because this false Hunger has been admitted.

If any one has this Hunger, he had better overcome it at once; and the only safe way to overcome it is to starve it out by refusing to satisfy it with more tobacco.

LVI. A REVIEW.

A WRITTEN LESSON.

Write the following:

True friends warn us of danger.

False friends lead us into danger.

True friends are always careful of our interests.

False friends pretend that they are careful of our interests; but they do this only to betray those who put confidence in them.

Alcohol is a poison—and yet it makes men believe that it is their friend.

Tobacco is of no use, and does only harm—and yet it makes men believe that it is their friend.

Alcohol steals away the senses; it betrays its friends.

Tobacco often dulls one's sense of decency; it betrays its friends.

Both alcohol and tobacco injure the nerves, the heart, the stomach.

Alcohol creates a depraved thirst; tobacco causes tobacco-hunger.

LVII. THE YOUNG PERSIAN PRINCE.

A READING LESSON.

Very many years ago there lived in Persia a young prince whose name was Cyrus. His father was a great king and ruled over many thousands of people. But Cyrus was not allowed to have many luxuries. Like the other boys of that country, he lived much of the time in the open air, he exercised his body in such a way as to make it strong, he slept on a hard bed, and he ate only the plainest food. He learned to work with his hands, to travel long distances on foot, and to endure fatigue and hardships. That was the way in which the Persians of that time brought up their boys; and these boys grew to be strong-bodied and graceful, full of courage, and as noble-minded as they were brave.

Once when Prince Cyrus was twelve years old he went with his mother to Media to visit his grandfather, who was King of that country.

He found that the boys of Media were very different from those he had known in Persia. They wore costly clothing, they ate rich food, and they liked to lounge about on soft cushions without anything at all to do; and even before they grew to be men they learned to drink strong wine.

The prince's grandfather was much pleased with his graceful, winning ways, and his strong, lithe body; and he liked to have him with him as much of the time as possible. One day the King's cupbearer was ill, and Cyrus asked to be allowed to take his place. This pleased his grandfather very much.

"Certainly you may be my cupbearer," he said; "for there is no one in all the land that can serve me better."

Now it was the custom in those times that when any food or drink was offered to the King, the person who offered it should taste it first. This must be done in order to show that it had not been poisoned. But when Cyrus brought the wine-cup to his grandfather he did not do this.

"My dear boy," said the old King, "have you not forgotten something?"

"I have brought you the wine in the cup," said Cyrus, "and I do not think that I have forgotten anything. But why do you ask?"

"My cupbearer always tastes the wine before he hands it to me," said the King.

"Ah, so he does," said the lad; "but I do not taste it. There is poison in it."

"Poison in it!" cried the King in great alarm. "How do you know there is poison in it?"

"There was poison in the wine that you drank at the great banquet last week; and although your cupbearer tasted of every cup he did not tell you about it. There was so much poison in it that it made you act very silly and say many foolish things. And the lords and nobles who were with you drank so much of the poisonous liquor that they did not know what they were about. Some of them went to sleep on the floor, and others fell down in the street and acted more like beasts than men. Even the cupbearer had taken so much that he was unable to stand. And so, grandfather, I did not taste the wine, for I do not want to be poisoned."

"What a strange boy you are!" said the King; "and still I half believe you are right. I had never thought of this before; but it really seems as if we men like to be poisoned. I suppose it is so with your father also."

"No indeed, it is not," answered Cyrus. "My father does not drink poison, and hence he never loses his senses."

"But your father drinks wine, does he not?" said the King.

"Never," said Cyrus. "When he is thirsty he drinks water, but never anything stronger."

"My dear boy," said the old King, dropping the wine-glass from his hand, "you are to-day a greater king than I; for you are the master of your own appetites, while I am the slave of strong drink. The Persian boys are trained aright."

And if you will read the history of that time you will learn how Cyrus afterwards became one of the wisest and noblest kings that the world has ever known. This could not have been so had he been a drinker of strong drinks.

Another wise King once said: "Wine is a mocker, strong drink is raging, and whosoever is deceived thereby is not wise. Look not upon the wine when it is red, when it moveth itself aright. At the last it biteth like a serpent, and stingeth like an adder."

Do you ask how it can bite? Like the serpent, it puts poison into the blood. The blood carries this poison, as it does the poison of the serpent, to the heart, the brain, the nerves, every part of the body. It may not cause death, but it will, sooner or later, produce great harm.

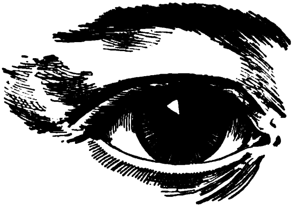
LVIII. FIVE SPECIAL FRIENDS.

A LESSON TO BE LEARNED.

The body has five special friends that attend to its comfort and pleasure, warn it of danger, and enable it to become acquainted with other objects. These five special friends help not only the body, but the mind; for it is by their aid that the mind obtains all its knowledge of the outside world. We esteem them highly, and the loss of one of them is a great misfortune. They are often called the *Special Senses.*

The first is Touch, or Feeling. It is near of kin to Pain, and yet it is generally a source of pleasure. It acts through the nerves that are situated in the skin, and tells us about the different objects that come in contact with the body. In the tips of the fingers this sense of Touch is very acute. It tells whether an object is hard or soft, smooth or rough, round or square, solid or liquid, and enables us often to distinguish many other qualities.

The second of these special friends is the sense of Sight. It acts through the eyes, and by means of the nerves that are situated in the back part of each eye it informs the brain of the appearance of the objects that are around us. If it were not for this sense we could not distinguish light from darkness, or one color from another. People who are bereft of this sense are said to be blind.



The eyes, which are the organs of sight, are very wonderfully made. Are the eyes of all persons alike? Are all the same color? Name some of the different colors. What part of the eye is colored?

The part of the eye that is colored acts like a curtain to regulate the amount of light that is let in upon the nerves behind it. Do you see the round, black spot in the center of this colored part? It is only a hole in the curtain for the light to pass through. It is called the *pupil* of the eye. Look at the eyes of a cat. When it is brought into a well-lighted room, the pupils become very small, and thus keep the light from paining the delicate nerves of the eyes. But if the little animal be carried into a dark room, the pupils will soon become large and round, allowing so much light to enter that the cat can see objects plainly in spite of the darkness. The pupils of your own eyes act in the same way, though to a smaller extent.

The sense of sight is often injured, sometimes entirely lost, through neglect to care for the eyes. Here are a few good rules that are worth observing:

Do not sit facing a bright light when you are reading or at work. Let the light shine over your shoulder upon your book or the object which you have in hand.

Do not strain the eyes by trying to read in a poor light.

Do not try to read when you are ill, for then the nerves of the eyes are weak and they may be injured by overtaxing their strength.

Do not read often when riding on the cars, for the eyes soon become weary trying "to keep the place," and the delicate nerves will be injured.

If some little object, such as a cinder, a gnat, or a hair, should get into the eye, have a care not to rub the eye hard. Take hold of the eyelashes of the upper eyelid and pull the eyelid down and away from the eye. In a moment or two the tears will begin to flow and will probably wash the troublesome object away.

Without eyes we should, indeed, be in a sorry plight. We could spare almost any other one of the senses better than the sense of Sight.

The sense of Hearing is another special friend that does much for our comfort and pleasure. This sense acts through the ears. By means of nerves that are in the interior of each ear the sensation of sound is carried to the brain. Some people can hear much better than others. When a person is bereft of this sense, we say he is deaf.

THE OUTER EAR.

The tube which is the opening of the ear is nearly an inch long. It is closed at its inner end by a thin membrane, or delicate kind of skin, that is stretched entirely across it. This membrane is called the membrane of the drum of the ear, because it is a little like the thin covering of the head of a drum.

Sometimes the membrane of the drum of the ear is injured or broken, and then the sense of hearing is lost. A blow on the ear, or a loud, sharp noise, may do this. Sometimes the nerves of hearing that are situated far back of the drum are diseased or can not carry their messages to the brain. In that case, although the ear may appear to be perfectly sound, hearing is impossible. There are some persons who have been deaf all their lives.

The next one of the special friends of the body is the sense of Taste. It acts through the tongue, and by means of very delicate nerves that are situated in the tongue it tells the brain what kind of food has entered the mouth. If it were not for this sense, we should miss much, if not all, of the pleasure that we have in eating. It is not an infallible guide, for often things which are agreeable to the taste are not wholesome. Taste only gives information to the brain; one's own knowledge and good judgment ought then to tell him whether the food is fit to be eaten or not.

Foods that are fitted to enrich the blood, to nourish the body, to build up or repair the worn-out muscles, should not be rejected on account of their lack of taste. But foods that are too highly seasoned, foods that are so rich as to overburden the stomach, foods that contain poisons—these should not be eaten, no matter how pleasant they may be to the taste.

The last of the five special friends of the body is the sense of Smell. It acts through the nose, and by means of delicate nerves situated within the passages of the nose it tells the brain what kind of odors are in the air. It is a very good friend, indeed, for it often warns us of the presence of disagreeable and poisonous objects which we would not otherwise perceive. The air in the neighborhood of dead and decaying substances is often full of poisonous matter which, if breathed into the lungs, may cause sickness and even death. It is only through the aid of the sense of smell that we are warned of this danger and persuaded to shun it.

The sense of smell also gives us pleasure; for who does not enjoy delightsome odors? It also sometimes comes to the aid of taste, helping it to distinguish good foods from bad. It is not so important to our happiness as is either sight or hearing; and yet we could not afford to be without this sense of Smell.

The body has many friends:

1. *Hunger, which tells it when food is needed.*
2. *Thirst, which tells it* ....
3. *Pain, which tells it* ....
4. *The sense of Sight, which* ....
2. *The sense of Hearing, which* ....
6. *The sense of Touch, which* ....
7. *The sense of Taste, which* ....
8. *The sense of Smell, which* ....

Which of these friends do we like? Which do we dislike? Why?

LIX. THE SENSES.

We have five senses:

Touch,
Sight,
Hearing,
Taste,
Smell.

Touch acts through the nerves of the skin. It is very sensitive in the tips of the fingers.

Sight acts through the ____________.
Hearing acts through the __________.
Taste acts through the ____________.
Smell acts through the ____________.

LX. HOW OUR FRIENDS MAY BE ABUSED.

A LESSON TO BE TALKED ABOUT.

The sense of touch is often harmed by the use of beer, whisky, wine, and other liquors. All alcoholic drinks are likely to deaden the nerves of the skin so that they cannot do their work well. Hence, persons who are in the habit of using them do not have so delicate a sense of touch as they would otherwise have.

The sense of sight is sometimes destroyed by the use of alcoholic liquors. The eyes of the drinker of strong drinks are almost always red and weak. The smoking of tobacco also does much harm to the eyes and injures the sense of sight.

The delicate nerves of hearing are sometimes injured by the use of alcohol. Many persons who drink alcoholic liquors are troubled with deafness, or with troublesome sensations in the ear.

The sense of taste may be destroyed by the use of strong drinks; for alcohol acts upon the nerves in the tongue in such a way as to deaden them and make it impossible for them to carry the sensation to the brain. Tobacco, too, acts much in the same way. It also sometimes aggravates, if it does not cause, a painful and dreadful disease called cancer of the tongue.

The sense of smell is deadened by the use of tobacco. Smoke from cigars and cigarettes, as well as the snuff which some people are in the habit of taking, tends to injure the nerves that are situated within the nose. Users of tobacco, therefore, are seldom able to perceive the delicate odors of fruits and flowers which would otherwise give them much pleasure.

Is it not plain to you that if you abuse any one of these five good friends of yours you will suffer for it?

You have already learned how one's strength may be lost and how one's happiness may be destroyed by allowing false friends to take the place of true.

An important fact which every young person should remember is this: *The health and strength of the body in manhood depends very much upon the way in which it is cared for during youth.*

Another fact to be remembered is this: Neither alcohol nor tobacco ever increases one's strength or improves one's health; on the contrary, they are liable, whenever used, to injure or destroy both health and strength.

LXI. THINGS REMEMBERED.

A REVIEW LESSON.

Now tell all that you can about the following topics:

1. *The uses of food.*
2. *The best kinds of food.*
3. *What the food does.*
4. *How foods differ from poisons.*
5. *How to care for the teeth.*
6. *What exercise does.*
7. *The best kinds of exercise.*
8. *How the bones give shape to the body.*
9. *Why one should sit or stand erect.*
10. *What the blood does.*
11. *How the blood flows.*
12. *How to stop bleeding.*
13. *How poisons act in the body.*
14. *Why alcohol is harmful.*
15. *Why tobacco is harmful.*
16. *Why fresh, pure air is necessary.*
17. *Why the skin should be kept clean.*
18. *How to care for the eyes.*
19. *How to distinguish between true friends, and false.*
20. *How to attain to a healthy and happy life.*

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